Julimar Appraisal Drilling and Surveys Environment Plan

April 2023

Revision 0

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1 Overview

Woodside Energy Julimar Pty Ltd (Woodside), as Titleholder under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (referred to as the Environment Regulations), on behalf of the Joint Venture detailed in **Section 1.7**, plans to perform geotechnical and geophysical surveys, drilling, appraisal and decommissioning of the Julimar South-1 well, hereafter referred to as the Petroleum Activities Program which forms the scope of this Environment Plan (EP). A more detailed description of the activities is provided in **Section3**.

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).

1.2 Defining the Petroleum Activity

The Petroleum Activities Program to be undertaken in Petroleum Title WA-49-L comprises drilling, appraisal, decommissioning and survey activities that are defined as Petroleum Activities in Regulation 4 of the Environment Regulations, meaning an EP is required.

1.3 Purpose of the Environment Plan

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

- 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 '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 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* [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. These form the basis for monitoring, auditing, and managing the Petroleum Activities Program to be undertaken by Woodside and its contractors. The implementation strategy (derived from the decision support framework tools) 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.

1.4 Scope of the Environment Plan

The scope of this EP covers the activities that define the Petroleum Activities Program, as described in **Section 3**.

1.5 Environment Plan Summary

An EP summary will be prepared based on the material provided in this EP. **Table 1-1** summarises the content provided within the EP summary, as required by Regulation 11(4).

Table 1-1: EP Summary

EP Summary material requirement	Relevant section of this EP containing EP Summary material
The location of the activity	**Section 3.3**
A description of the receiving environment	**Section 4**
A description of the activity	**Section 3**
Details of the environmental impacts and risks	**Section 6**
The control measures for the activity	**Section 6**
The arrangements for ongoing monitoring of the titleholder's environmental performance	**Section 7.5**
Response arrangements in the oil pollution emergency plan	**Section 7.9**
Consultation already undertaken and plans for ongoing consultation	**Section 5**
Details of the titleholder's nominated liaison person for the activity	**Section 1.8.2**

1.6 Structure of the Environment Plan

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

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

Criteria for acceptance	Content Requirements/Relevant Regulations	Elements	Section of EP
Regulation 10A(a): is appropriate for the nature and scale of the activity	Regulation 13: Environmental Assessment Regulation 14: Implementation strategy for the environment plan Regulation 16: 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 10A(b): demonstrates that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable Regulation 10A(c): demonstrates that the environmental impacts and risks of the activity will be of an acceptable level	Regulation 13(1)–13(7): 13(1) Description of the activity 13(2)(3) Description of the environment 13(4) Requirements 13(5)(6) Evaluation of environmental impacts and risks 13(7) Environmental performance outcomes and standards Regulation 16(a)–16(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 10A(d): provides for appropriate	Regulation 13(7): Environmental performance outcomes and standards	Environmental Performance Objectives (EPOs)	**Section 6**

Criteria for acceptance	Content Requirements/Relevant Regulations	Elements	Section of EP
environmental performance outcomes, environmental performance standards and measurement criteria		Environmental Performance Standards (EPSs) Measurement Criteria (MC)	
Regulation 10A(e): includes an appropriate implementation strategy and monitoring, recording and reporting arrangements	Regulation 14: Implementation strategy for the environment plan	Implementation strategy, including: • systems, practices and procedures • performance monitoring • Oil Pollution Emergency Plan (OPEP – **per Appendix D**) and scientific monitoring • ongoing consultation.	**Section 7** **Appendix D**
Regulation 10A(f): does not involve the activity or part of the activity, other than arrangements for environmental monitoring or for responding to an emergency, being undertaken in any part of a declared World Heritage property within the meaning of the EPBC Act	Regulation 13 (1)–13(3): 13(1) Description of the activity 13(2) Description of the environment 13(3) Without limiting [Regulation 13(2)(b)], particular relevant values and sensitivities may include any of the following: (a) the world heritage values of a declared World Heritage property within the meaning of 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.	No activity, or part of the activity, undertaken in any part of a declared World Heritage property	**Section 3** **Section 4** **Section 6**
Regulation 10A(g): (i) the titleholder has carried out the consultations required by Division 2.2A	Regulation 11A: Consultation with relevant authorities, persons and organisations, etc. Regulation 16(b): A report on all consultations between the titleholder and any relevant person	Consultation in preparation of the EP	**Section 5**

Criteria for acceptance	Content Requirements/Relevant Regulations	Elements	Section of EP
(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate			
Regulation 10A(h): complies with the Act and the regulations	Regulation 15: Details of the Titleholder and liaison person Regulation 16(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 7.6** **Section 7.8**

1.7 Description of the Titleholder

Woodside is the Titleholder for this activity and also a joint venture participant together with KUFPEC Australia (Julimar) Pty Ltd .

Wherever Woodside works, it is committed to living its values of integrity, respect, working sustainably, discipline, excellence and working together. Woodside's operations are characterised by strong safety and environmental performance in remote and challenging locations. Woodside's mission is to deliver superior shareholder returns through realising its vison of becoming a global leader in upstream oil and gas.

Since 2015 the company has been operating the Julimar field on behalf of the Joint Venture. 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://woodside.com.

1.8 Details of Titleholder, Liaison Person and Public Affairs Contact

In accordance with Regulation 15 of the Environment Regulations, details of the titleholder, liaison person and arrangements for the notification of changes are described below.

1.8.1 Titleholder

Woodside Energy Julimar Pty Ltd

11 Mount Street

Perth, Western Australia

T: 08 9348 4000

E: feedback@woodside.com.au

CAN: 63 005 482 986

1.8.2 Nominated Liaison Person

Shannen Wilkinson

Senior Corporate Affairs Adviser

11 Mount Street

Perth, Western Australia

T; 08 9348 4000

E: feedback@woodside.com.au

1.8.3 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.

1.9 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: Our Values and Policies; Expectations; Processes and Procedures; and Guidelines, as outlined below (and illustrated in **Figure 1-1**).

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

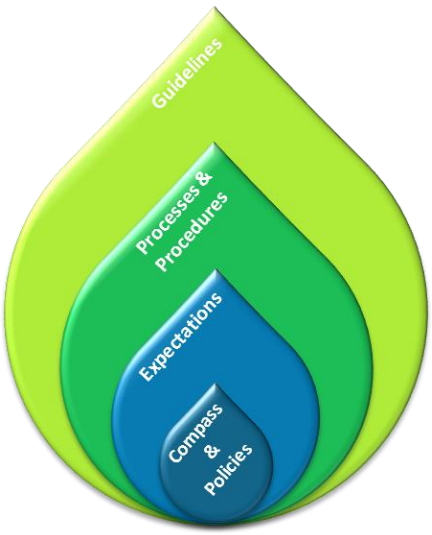


Figure 1-1 The four major elements of the WMS Seed

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

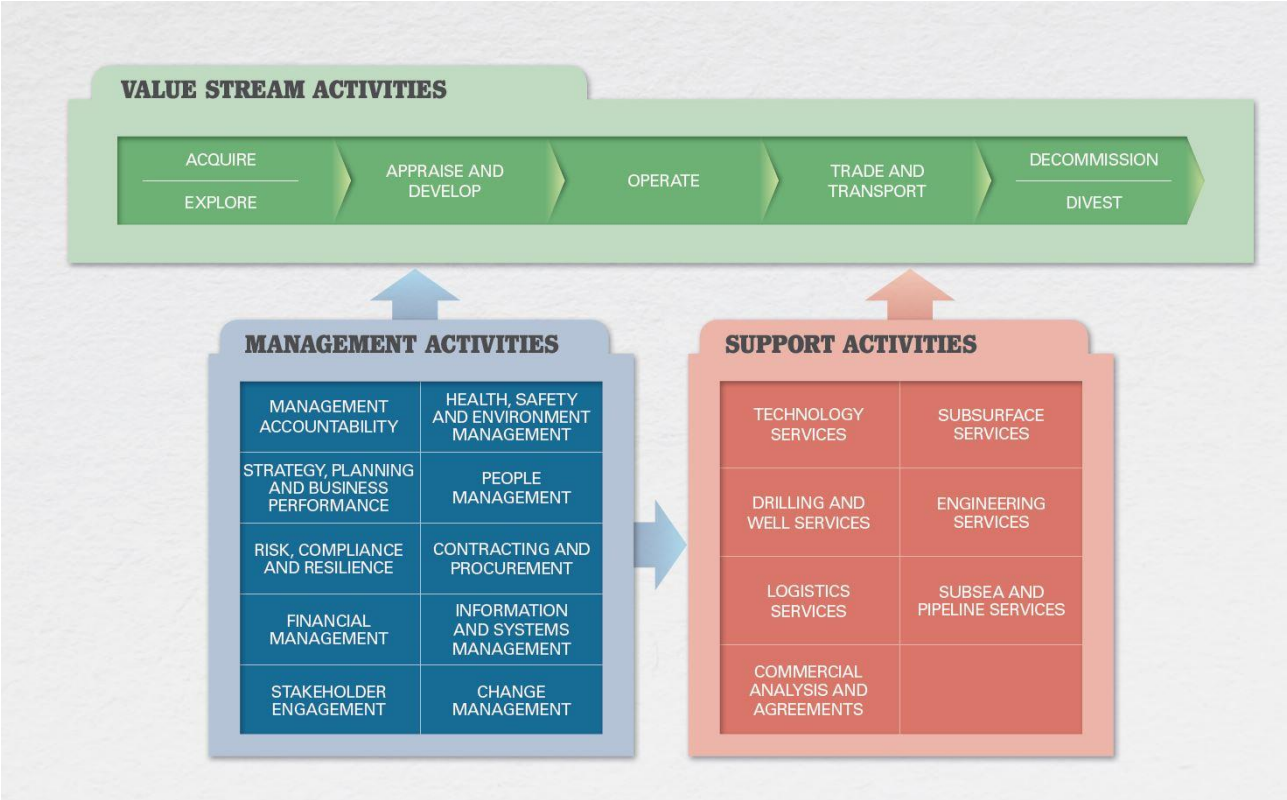


Figure 1-2: The WMS business process hierarchy

1.9.1 , Environment and Biodiversity Policy

In accordance with Regulation 16(a) of the Environment Regulations, Woodside's Corporate Environment and Biodiversity Policy is provided in **Appendix A** of this EP.

1.10 Description of Relevant Requirements

In accordance with Regulation 13(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 *WA Environment Protection Act 1986* as the activity does not occur on State land or within State Waters.

1.10.1 Offshore Petroleum and Greenhouse Gas Storage Act 2006

The *Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006* (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 objective of the Act is to provide a regulatory framework for petroleum exploration and recovery, greenhouse gas activities in offshore areas.

Under the 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:

- carried out in a manner consistent with the principles of ESD.
- carried out in a manner by which the environmental impacts and risks of the activity will be reduced to ALARP.
- carried out in a manner by which the environmental impacts and risks of the activity will be of an acceptable level.

1.10.2 Environment Protection and Biodiversity Conservation Act 1999

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 Ecologically Sustainable Development (ESD). When a person proposes to take an action 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 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 Act.

1.10.2.1 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 Program. Commitments relating to listed threatened species and ecological communities under the Act are included in the Program Report (Commonwealth of Australia, 2014):

- NOPSEMA will not accept an EP that proposes activities that will result in unacceptable impacts to a listed threatened species or ecological community.
- NOPSEMA will not accept an EP inconsistent with a recovery plan or threat abatement plan for a listed threatened species or ecological community.
- NOPSEMA will have regard to any approved conservation advice in relation to a threatened species or ecological community before accepting an EP.

1.10.2.2 Australian Marine Parks

Under the EPBC Act, Australian Marine Parks (AMPs), formally 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 (s362 of the EPBC Act). Relevant AMPs are listed in **Section 4.8** and described in the Woodside Master Existing Environment. In accordance with Regulation 31 of the Environmental Regulation, this Master Existing Environment was accepted on 14th October 2022 as Appendix H in the Enfield Plug and Abandon EP. 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 EPBC Regulations 2000:

- Special Purpose Zone (IUCN category VI): managed to allow specific activities through special purpose management arrangements while conserving ecosystems, habitats and native species. The zone allows or prohibits specific activities.
- Sanctuary Zone (IUCN category Ia): managed to conserve ecosystems, habitats and native species in as natural and undisturbed a state as possible. The zone allows only authorised scientific research and monitoring.
- National Park Zone (IUCN category II): managed to protect and conserve ecosystems, habitats and native species in as natural a state as possible. The zone only allows non-extractive activities unless authorised for research and monitoring.
- Recreational Use Zone (IUCN category IV): managed to allow recreational use, while conserving ecosystems, habitats and native species in as natural a state as possible. The zone allows for recreational fishing, but not commercial fishing.
- Habitat Protection Zone (IUCN category IV): managed to allow activities that do not harm or cause destruction to seafloor habitats, while conserving ecosystems, habitats and native species in as natural a state as possible.
- Multiple Use Zone (IUCN category VI): managed to allow ecologically sustainable use while conserving ecosystems, habitats and native species. The zone allows for a range of sustainable uses, including commercial fishing and mining where they are consistent with park values.

1.10.2.3 World Heritage Properties

Australian World Heritage management principles are prescribed in Schedule 5 of the EPBC Regulations 2000. Management principles considered relevant to the scope of this EP are provided in **Table 1-3.**

Table 1-3 Relevant Management Principles under Schedule 5 – Australian World Heritage management principles of the EPBC Act.

Number	Principle	Relevant Section of the EP
3	Environmental impact assessment and approval 3.01 This principle applies to the assessment of an action that is likely to have a significant impact on the World Heritage values of a property (whether the action is to occur inside the property or not).	3.01 and 3.02: Assessment of significant impact on World Heritage values is included in **Section 4.8**. Principles are met by the submitted EP.

	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: (a) identify the World Heritage values of the property that are likely to be affected by the action; and (b) examine how the World Heritage values of the property might be affected; and (c) 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.	3.03 (a) and (b): World Heritage values are identified in **Section 4.8** and considered in the assessment of impacts and risks for the Petroleum Activity in **Section 6**. 3.03 (c): Relevant stakeholder 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 Woodside follows to prepare the EP once an activity has been defined as a petroleum activity. The process (**Section 2.2**) describes the environmental risk assessment methodology used to identify, analyse and evaluate risks to meet ALARP and acceptability requirements and to develop EPOs and EPSs. This section also describes Woodside's risk management methodologies applicable to implementation strategies applied during the activity.

Regulation 13(5) of the Environment Regulations requires the detailing of environmental impacts and risks, and evaluation appropriate to the nature and scale of each impact and risk associated with the Petroleum Activities Program and potential emergency conditions. 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 determine if the impact or risk level is acceptable.

Environmental impacts and risks assessed include those directly and indirectly associated with the Petroleum Activities Program and includes potential emergency and accidental events.

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

Herein, 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 risk is inherent to its business and effective management of risk is vital to delivering on company objectives, success and continued growth. Woodside is committed to managing all 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. Woodside's 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:

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

The risk management methodology provides a framework to demonstrate risks and impacts are continually identified, reduced to ALARP and assessed to be at an acceptable level, as required by the Environment Regulations. The key steps of Woodside's Risk Management Process are shown in **Figure 2-1**. A description of each step and how it is applied to the scopes of this activity is provided in **Sections 2.2** to **2.11**.

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 people and organisations, and the applicable framework of standards and practices.

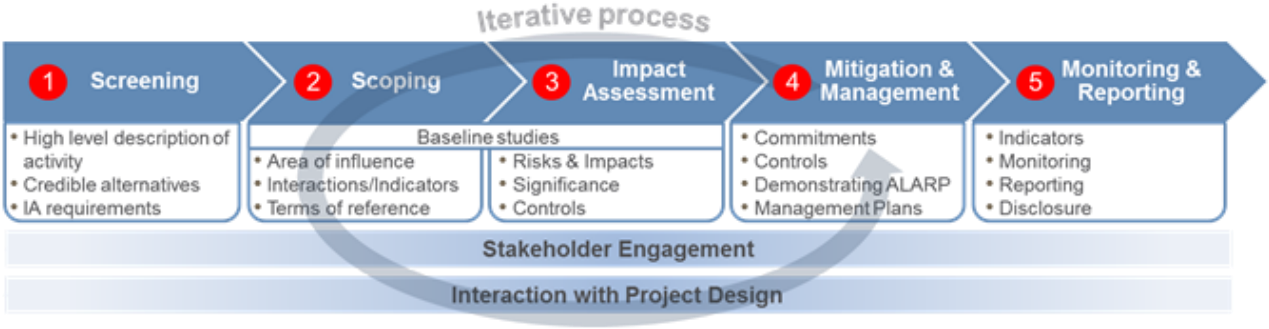


Figure 2-2: Woodside's impact assessment process

2.3 Environment Plan Process

Figure 2-3 illustrates the EP development process. Each element of this process is discussed further in **Sections 2.5** to **2.10**.

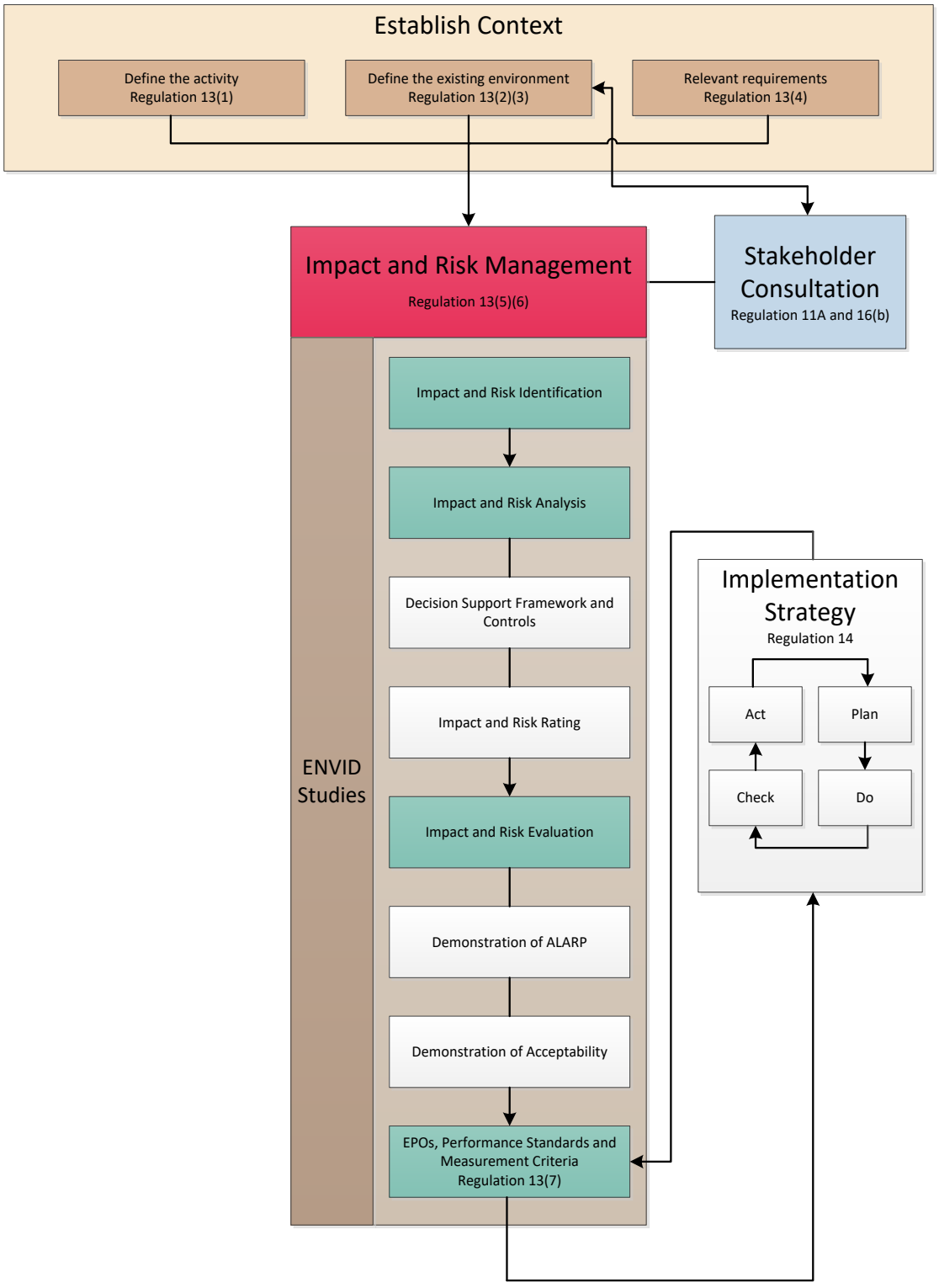


Figure 2-3: Environment Plan development process

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'[1] 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 3**. In accordance with Regulation 31(1) of the Environment Regulations, references to the Master Existing Environment, Appendix H in the Enfield Plug and Abandonment Environment Plan (hereafter referred to as the Master Existing Environment), have been made throughout this EP. This EP (NOPSEMA EP No: A803388) was accepted on the 14th of October 2021 and is available on the NOPSEMA website: Enfield Plug and Abandonment EP. The purpose is to describe the existing environment that may be impacted by the activity, directly or indirectly, by planned or unplanned[2] events.

The Existing Environment (**Section 4**) is structured into subsections defining the physical, biological, socioeconomic and cultural attributes of the area of interest, in accordance with the definition of environment in Regulation 4(a) 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 Operational Area and wider environment that may be affected

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

[2] 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, which provides context to the 'nature and scale' of the existing environment.

(EMBA), as determined by the hydrocarbon spill risk assessments presented in **Section 6.8.1**. MNES, as defined within 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.

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

Environmental Value Potentially Impacted Regulations 13(2)(3)						
Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl. Odour)	Ecosystems/ Habitats	Species	Socioeconomic

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 Corporate Environment and Biodiversity Policy ispresented 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 the activity.

The environmental impact and risk assessment presented in this EP has been informed by recent and historic hazard and environment identification studies (e.g. HAZID/ENVID), PSRA processes, reviews, and desktop 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 5**). The environmental outputs of applicable risk and impact workshops and associated studies are referred to as ENVID in this EP.

The ENVID was undertaken by multidisciplinary teams comprising relevant engineering 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 ENVID 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.

The impact and risk information was classified, evaluated and tabulated for each planned activity and unplanned event. Environmental impacts and risk were recorded in an environmental impacts and risk register. The output of the ENVID 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	Socioeconomic	Decision Type	Consequence / Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability
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 stakeholder consultation feedback, and the existing environment.

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

- identify the decision type in accordance with the decision support framework
- identify appropriate control measures (preventive and mitigation) aligned with the decision type
- assess the risk rating.

2.6.1 Decision Support Framework

To support the risk assessment process and Woodside's determination of acceptability (**Section 2.7.2**), 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 was applied during the ENVID, or equivalent processes during historical design decisions, 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 (**Figure 2-4**). 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 ENVID worksheets.

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

2.6.1.1 Decision Type A

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

2.6.1.2 Decision Type B

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

2.6.1.3 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 stakeholder consultation as part of the risk assessment process.

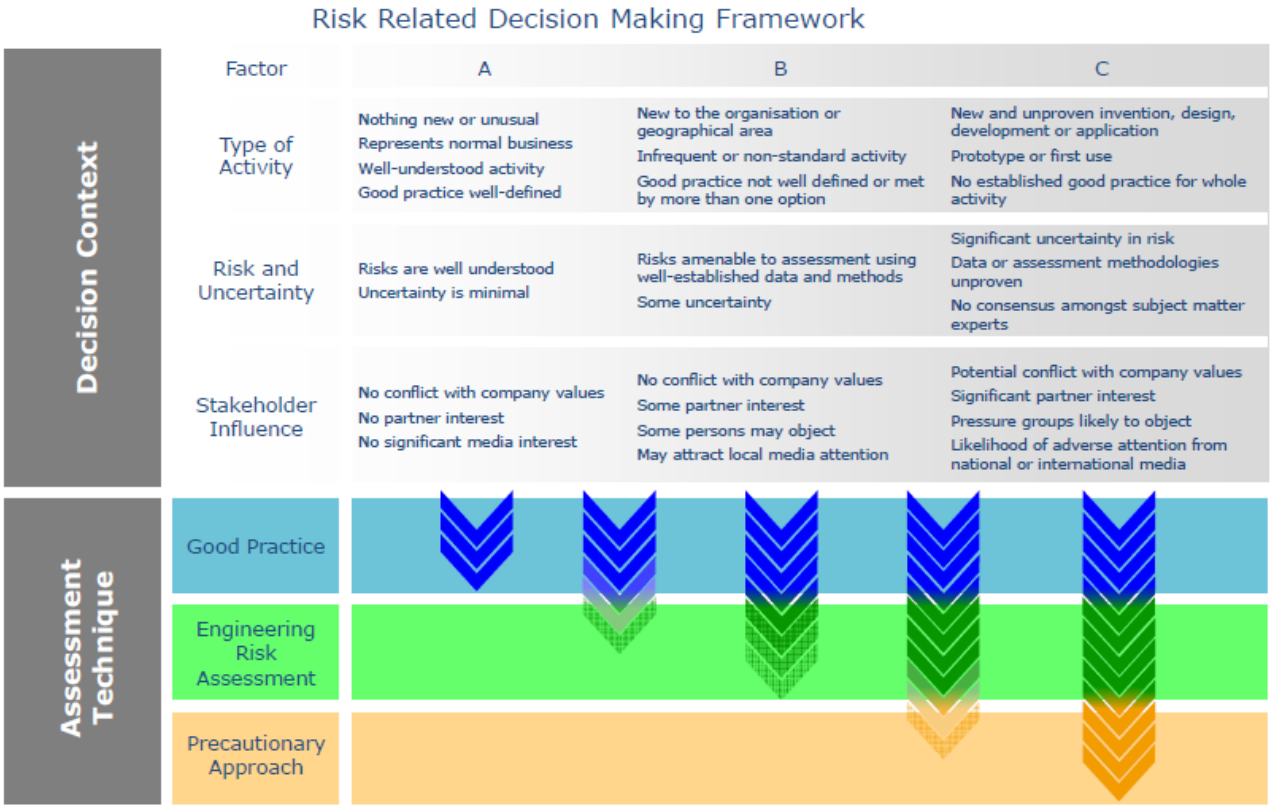


Figure 2-4: Risk-related decision making framework (Oil and Gas UK, 2014)

2.6.1.4 Decision Support Framework Tools

These framework tools are applied, as appropriate, to help identify control measures based on the decision type descried 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 and policies. 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 stakeholders and addresses relevant stakeholder views, concerns and perceptions.

2.6.1.5 Decision Calibration

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

- **LCS/ Verification of Predictions** – Verification of compliance with applicable LCS and/ or good industry practice.
- **Peer Review** – Independent peer review of PJs, supported by RBA, where appropriate.
- **Benchmarking** – Where appropriate, benchmarking against a similar facility or activity type or situation that has been deemed to represent acceptable risk.
- **Internal Stakeholder Consultation** – Consultation undertaken within Woodside to inform the decision and verify company values are met.
- **External Stakeholder Consultation** – Consultation undertaken to inform the decision and verify societal values are considered.

Where appropriate, additional calibration tools may be selected to specify 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 of 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 (represented by **Figure 2-5**).

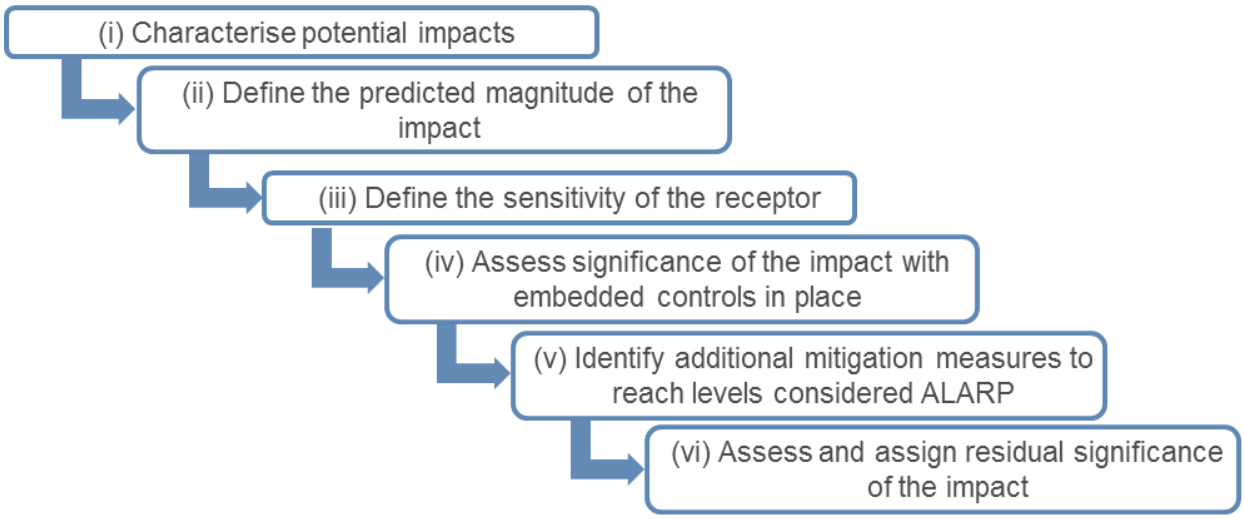


Figure 2-5: Environmental risk and impact analysis

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 (10–50 years) on highly valued ecosystem, species, habitat or physical or biological attribute.	Major, long-term impact (5–20 years) to a community, social infrastructure or highly valued area/item of national cultural significance.	**B**
Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	Moderate, medium term impact (2–5 years) to a community, social infrastructure or highly valued area/item of national cultural significance.	**C**
Minor, short-term impact (1–2 years) on species, habitat (but not affecting ecosystem function), physical or biological attribute.	Minor, short-term impact (1–2 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**

2.6.3.1 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 (**Figure 2-6**).

The risk rating process is done using the steps described in the subsections below.

2.6.3.1.1 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.

2.6.3.1.2 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 100,000–1,000,000 years	1 in 10,000–100,000 years	1 in 1,000–10,000 years	1 in 100–1,000 years	1 in 10–100 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**

2.6.3.1.3 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.

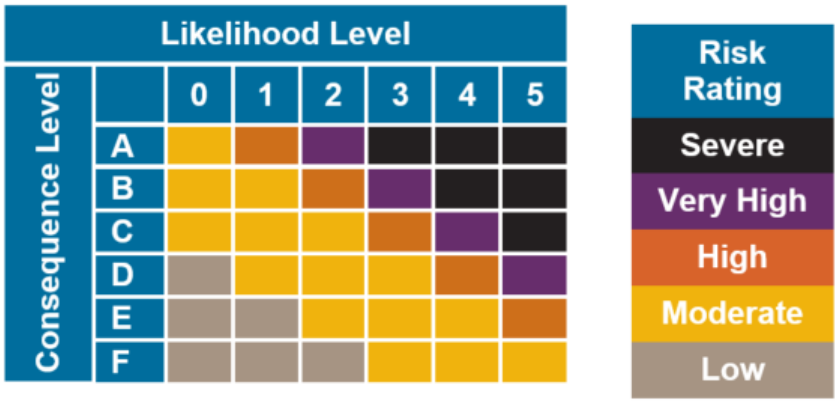


Figure 2-6: Woodside risk matrix – risk level

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

2.7 Impact and Risk Evaluation

Environmental impacts and risks cover a wide 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 levels are consistent with national and international standards, laws and policies.

In accordance with Environment Regulation 10A(a), 10A(b), 10A(c) and 13(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 and risk.

2.7.1 Demonstration of ALARP

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

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

Risk	Impact	Decision Type
Low and Moderate (below C 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 (C+ consequence risks)	**Moderate and above (A, B, C)**	**B and C**
Woodside demonstrates these higher-order risks, impacts and decision types are reduced to ALARP (where it can be demonstrated using good industry practice and risk-based analysis) that: • legislative requirements, applicable company requirements and industry codes and standards are met • societal concerns are accounted for • the alternative control measures are grossly disproportionate to the benefit gained.		

2.7.2 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 (A, B, C)**	**B and C**
Woodside demonstrates these higher-order risks, impacts and decision types are of an 'Acceptable' level if it can be demonstrated that the predicted levels of impact and/or residual risk, are: • managed to ALARP (as described in **Section 2.7.1**) • meet the following criteria, appropriate to the nature and scale of each impact and risk: • the Principles of Ecological Sustainable Development 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). For potential C or above consequence/impact levels where significant uncertainty exists in analysis of the risk or impact (such as, for predicted or potential high risk of significant environmental impacts, significant project risk/exposure, novel activities, lack of consensus on standards, and significant stakeholder concerns. E.g. Decision Type C), acceptability may be required to be conducted separately for key receptors. This is not applicable for risks, given the consequence of an unplanned risk event occurring may not be acceptable and, therefore, acceptability is demonstrated in the context of the residual likelihood of an event occurring.		

Risk	Impact	Decision Type
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.		

2.8 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 1.10.2.1)**. The steps in this process are:

- identify relevant listed threatened species and ecological communities (**Section 4.5**).
- 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**).

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

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

2.10 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 stakeholder consultation is undertaken throughout the activity.

The implementation strategy is presented in **Section 7**.

2.11 Stakeholder Consultation

Woodside undertakes consultation in the course of preparing EPs. The consultation, along with the process for ongoing engagement and consultation throughout the activity, is presented in **Section 5**. A copy of the full text correspondence is provided in **Appendix F**.

3 DESCRIPTION OF THE ACTIVITY

3.1 Overview

This section has been prepared in accordance with Regulation 13(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 activities, operational details and additional information relevant to considering environmental risks and impacts.

3.2 Project Overview

The Julimar Field Production System is located in Commonwealth waters about 160 km north-west of Dampier and adjacent to the Chevron operated, Wheatstone Platform. The Julimar Field Production System includes wells in WA-49-L and flowlines/ pipelines in WA-26-PL and WA-29-PL.

Woodside proposes to drill a new appraisal well, Julimar South-1 accessing the J85 reservoir in the vicinity of the existing JULA manifold. It is intended that the well will target the deeper sands of the Julimar field to further understand reservoir properties, which is key to future development decisions.

Following appraisal activities, Woodside anticipates that the reservoir section will be isolated with cement plugs(s) and the well will be permanently abandoned. Results from appraisal of the well will be used to inform future development decisions which willbe subject to future environment plans. Wellhead removal is planned to occur under this EP as part of a subsequent Inspection, Maintenance and Repair (IMR) campaign.

Drilling operations and appraisal activities are planned to commence in about Q3 2023, however wellhead removal may be performed at any point within 3 years from completion of drilling activties.

Geotechnical and geophysical surveys could involve cone penetration tests, box cores, drop cores, piston cores and anchor/chain hold testing. Geophysical surveys may involve multibeam echosounder, side scan sonar, sub bottom profiler (sparker, boomer or chirp) and ultra-short baseline. Information from these surveys will inform safe and effective anchoring plans in future activities by better understanding seabed sediment characteristics in the area.

The Petroleum Activities Program therefore includes the drilling and suspension of an appraisal well (Julimar South-1) including P&A and geophysical and geotechnical surveys. Julimar South-1 well will be drilled within Petroleum Title WA-49-L with some anchor lines from the moored MODU entering Chevron operated Title Area WA-5-R. The geophysical and geotechnical survey area is largely within Title Area WA-49-L with some overlap of Chevron operated Petroleum Titles WA-5-R, WA-76-R and WA-526-P.

If required, contingent activities that Woodside may also need to perform include re-spud, side-track, well suspension, sediment mobilisation and relocation, venting and emergency disconnect sequence.

An overview of the Petroleum Activities Program is provided in **Table 3-1.**

Table 3-1: Petroleum Activities Program Overview

Item	Description
Petroleum Title	WA-49-L
Location	Barrow Sub-basin
Water depth	83 – 258 m
Number of wells	One Julimar appraisal well (Julimar South-1)
MODU	Moored MODU.

Item	Description
Vessels	• Survey vessel. • Support vessels including anchor handling vessel(s) and general supply/support vessels. • Subsea support vessel (planned for well head recovery)
Key activities	• Top hole section drilling. • Installation of blow-out preventer (and marine riser). • Bottom hole section drilling. • Appraisal activities including formation evaluation while drilling, and reservoir fluid sampling. • Permanent abandonment of well (planned or if necessary, for unforeseen circumstances). • Well head recovery by vessel such as a Mobile Offshore Unit, Well Intervention Vessel or a subsea support vessel (i.e. general purpose Inspection, Maintenance and Repair (IMR) vessel) within three years of completion of drilling activities). • Anchor/chain hold testing, prelay anchors by anchor handling vessel and mooring • Geophysical survey, including using: • multibeam echo sounders (MBES) • side scan sonars (SSS) • sub bottom profilers (SBP) • ultra-short baseline (USBL) acoustic positioning system. • Geotechnical testing and sampling survey, including using: • pore cone penetration testing (PCPT) • box core, drop core and piston core sampling • Contingent activities including; re-spud, side-track, sediment mobilisation and relocation, venting, emergency disconnect sequence.

3.3 Location

The Petroleum Activities Program is located in Commonwealth waters, about 182 km west-north-west of Dampier. The closest landfall to the Petroleum Activities Program is the Montebello Islands, about 54 km south-east (**Figure 3-1**). Approximate location details for the Petroleum Activities Program are provided in **Table 3-2**.

The Petroleum Activities Program is divided into two locations:

- The Julimar South-1 appraisal well located in WA-49-L.
- The geophysical and geotechnical survey area located across WA-49-L, WA-526-P, WA-76-R and WA-5-R (**Figure 3-2**).

Table 3-2: Approximate location details for the proposed Julimar appraisal well Julimar South-1 and Surveys

Activity	Water depth (approx. m LAT)	Latitude (WGS84)	Longitude (WGS84)	Petroleum title(s)
Well Location				
Julimar South-1 Appraisal Well*	~163 m	20° 09' 52.289"S	115° 02' 35.331"E	WA-49-L
Survey Location				
Survey Point A	~172 m	20° 10' 25.68"S	115° 01' 26.40"E	WA-5-R
Survey Point B	~236 m	20° 09' 9.00"S	114° 59' 40.20	WA-76-R
Survey Point C	~221	20° 03' 42.48"S	115° 04' 10.56"E	WA-526-P
Survey Point D	~174	20° 04' 58.44"S	115° 06' 1.80"E	WA-49-L

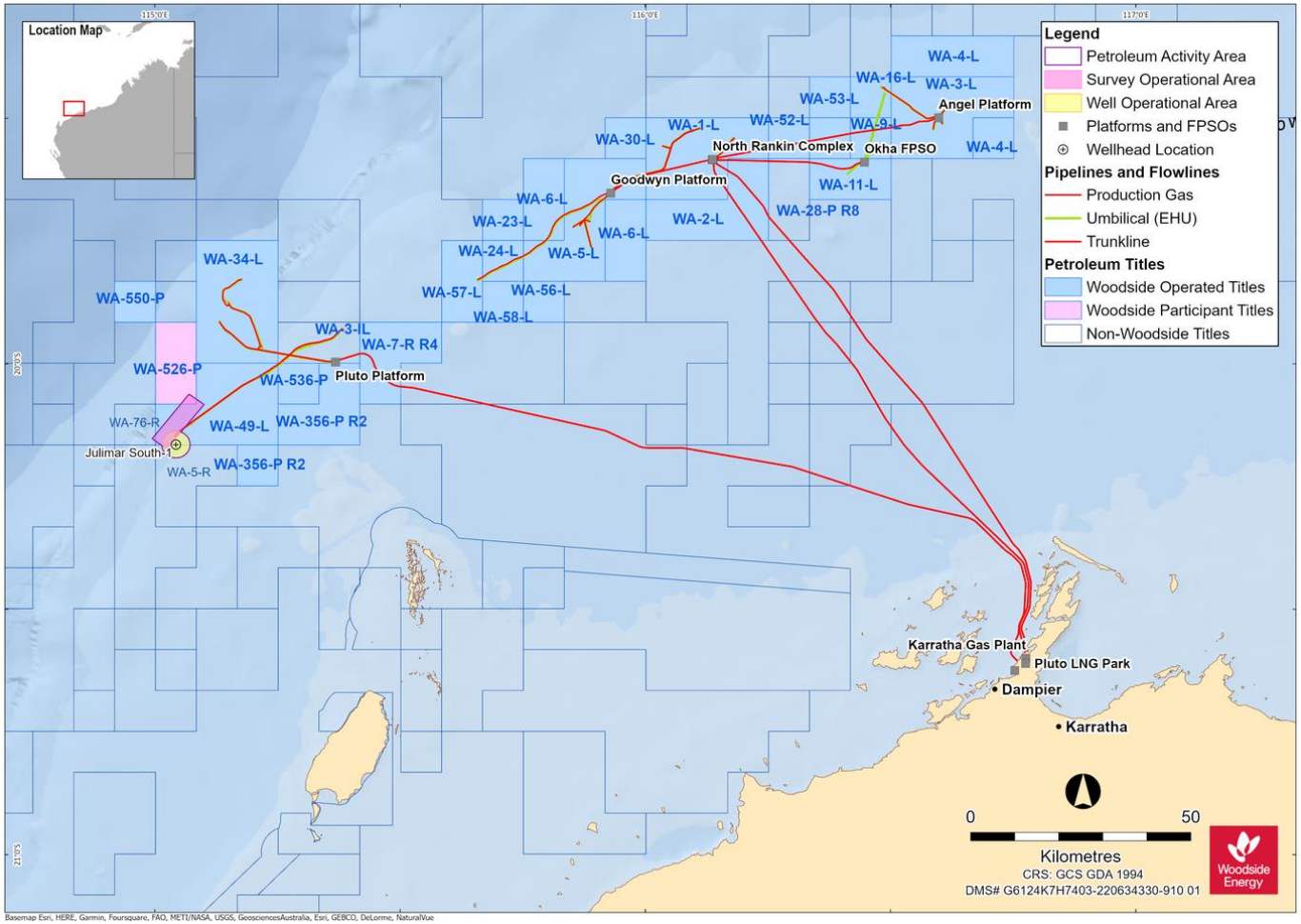


Figure 3-1: Location of the Petroleum Activities Program

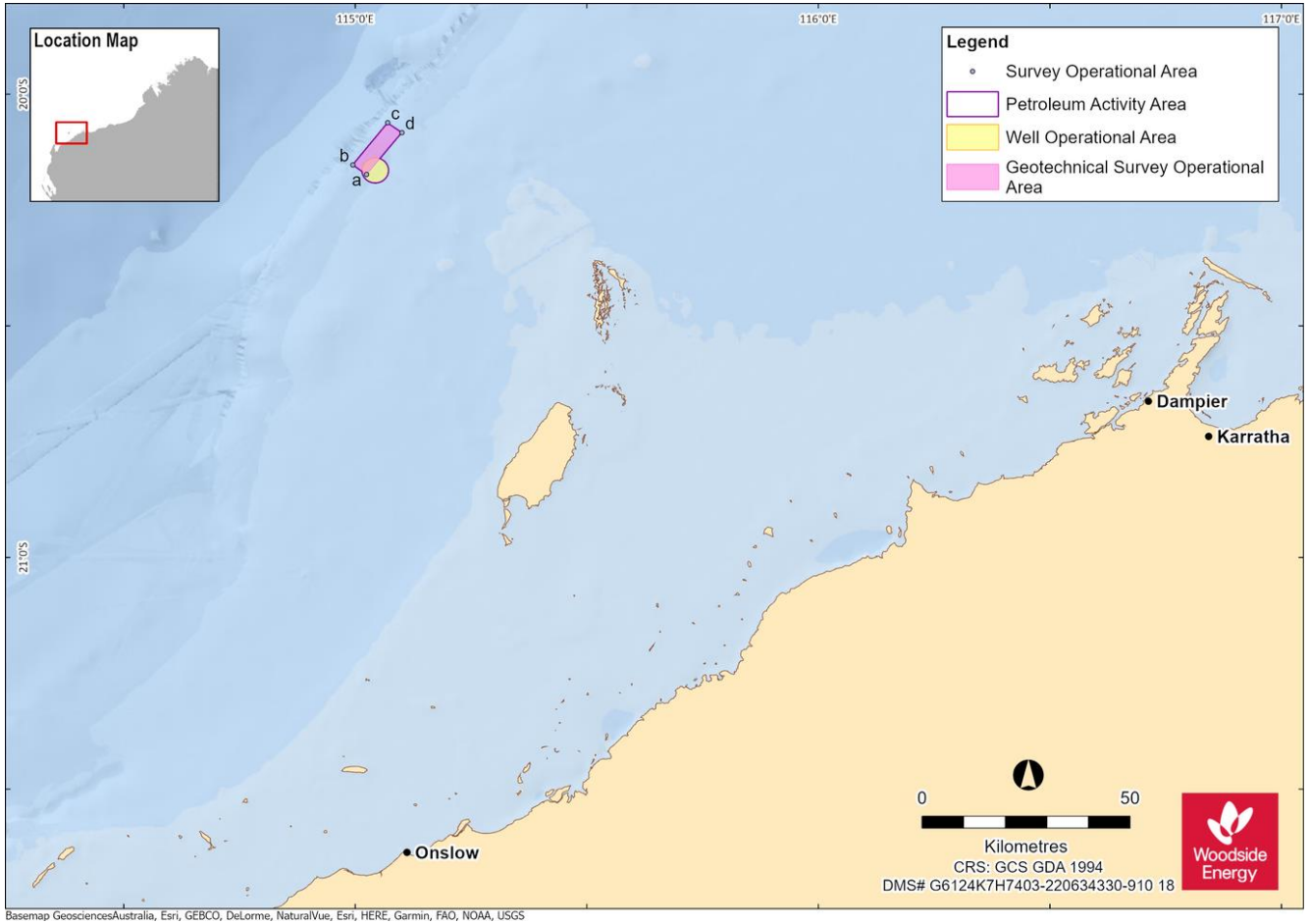


Figure 3-2: Survey coordinates

3.3.1 Petroleum Activity Areas

The spatial boundary of the Petroleum Activities Program has been described and assessed using the two Operational Areas. The combination of both Operational Areas defines the spatial boundaries of the Petroleum Activities Program, as described and risk assessed by this EP, including vessel related petroleum activities. For the purposes of this EP, the following Operational Areas will apply:

- The Well Operational Area: Encompasses a radius of about 3000 m around the Julimar South-1 well centre, in which drilling and P&A related petroleum activities will take place and will be managed under this EP. This Operational Area allows for temporary installation of MODU moorings. The Julimar South-1 well location is ~100 m from the WA-49-L Petroleum Title boundary and as such the Well Operational Area overlaps Chevron Operated WA-5-R Petroleum Title (this will include MODU mooring lines).
- Survey Operational Area: The survey area encompasses a ~50 km^2 area across which the geophysical and geotechnical survey may occur.

The Well Operational Area includes a 500 m safety exclusion zone around the MODU to manage vessel movements. The 500 m safety exclusion zone is under the control of the MODU Person in Charge.

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 supporting the Petroleum Activities Program when outside the PAA must adhere to applicable maritime regulations and other requirements.

3.4 Timing

The Petroleum Activities Program is currently anticipated to commence from about late Q3 2023 (**Table 3-3**). It is intended that:

- geophysical and geotechnical surveys will take approximately 45 days;
- drilling appraisal and plug and abandonment activities will take approximately 50 days; and
- wellhead decommissioning activities will take approximately one to two days.

Table 3-3: Summary of indicative timing for the Petroleum Activities Program

Activity	Approximate timing (and cumulative duration in the field*)1
Appraisal Drilling and Plug and Abandonment	Q3 2023 (~ 50 days) 2024, 2025 (contingency)
Geophysical and Geotechnical campaigns	2023 to 2025 (~45 days)
Decommissioning (wellhead removal)	2025 (~2 days) 2023, 2024, 2026 (contingency)

When underway activities will be 24 hours per day, seven days per week. Simultaneous Operations (SIMOPS) activities may occur (e.g. IMR work at the nearby JULA production manifold while the Petroleum Activities Program is underway). 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, throughout the year (all seasons) to provide operational flexibility for requirements and schedule changes and MODU/vessel availability.

3.5 Project Fluids

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 are acceptable, ALARP and meet Woodside's expectation for environmental performance. This is detailed in **Section 7.2.1.**

3.6 Drilling Activities

Well construction activities are conducted in a number of stages, as described below. Detailed well designs will be submitted to the Well Integrity Department of NOPSEMA as part of the approval to drill and the accepted Well Operation Management Plan (WOMP), as required under the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011.

3.6.1 Drilling Operations

3.6.1.1 Cement Unit Test

The MODU may be required 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 prior to 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 carried out, 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, the slurry is discharged through the usual cement unit discharge line (which may be up to 10 m above the sea level) or through drill pipe below sea level. The slurry is usually a mix of cement and mix water and cementing chemicals or chemical additives.

3.6.1.2 Top-Hole Section Drilling

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

- The MODU arrives and establishes position over the well site.
- Top-hole sections are drilled riserless using seawater with pre-hydrated bentonite/guar gum or similar sweeps or drilling fluids to circulate drilled cuttings from the wellbore (discharge to seabed during riserless drilling). As a contingency Pump and Dump (PAD) water-based mud may be used if required based on shallow hazards.
- Once the top-hole sections of the well have been drilled, steel tubulars (called conductor or casing) are inserted into the wellbore 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 will involve a discharge of excess cement at the seabed.

3.6.1.3 Blowout Preventer and Marine Riser Installation

After setting the surface casing, a blowout preventor (BOP) and marine riser is installed on the wellhead. The BOP provides a means for sealing, controlling and monitoring the well during drilling activities. The BOP components are operated using open hydraulic systems (utilising water-based

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

The marine riser provides a physical connection between the well and MODU. This enables a closed circulation system to be maintained, where weighted water-based muds (WBM) and cuttings can be circulated from the wellbore back to the MODU via the riser.

3.6.1.4 Bottom Hole Section Drilling

A closed system (riser in place), is used for drilling bottom hole sections to the planned wellbore total depth. The plan is for bottom hole sections to be drilled using WBM drilling fluids; however, non-water based mud (NWBM) may also be used.

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 is determined by factors such as the geology/subterranean pressures likely to be encountered in the area and any specific information or resource development requirements.

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

Cementing operations are also undertaken to:

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

Cement, barite and bentonite is transported as dry bulk to the MODU by the support vessels. Cement is 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.

Cuttings in drilling fluids circulated back to the MODU are separated from the drilling fluids by the solids control equipment (SCE). The SCE 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.

3.6.1.5 Drilling Fluids

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 have been assessed under Woodside's internal guidelines to ensure potential impacts are acceptable, ALARP and meet Woodside's expectation for environmental performance.

3.6.1.6 Water-Based Mud (WBM) System

The Petroleum Activities Program will use a water-based drilling fluid system as the planned option. WBM is mainly comprised of water (salt or fresh). Some basic additives such as bentonite/guar gum

may be added to the water for riserless tophole sections with further additives such as shale inhibitors and naturally modified polymers included for the intermediate and reservoir closed loop sections.

The WBM drilling fluid will either be mixed on the MODU or received pre-mixed, then stored and maintained in a series of pits aboard the MODU. The top-hole sections will be drilled riserless with seawater containing pre-hydrated gel sweeps, and cuttings and drilling fluids returned to the seabed. The bottom hole sections may be drilled using WBM in a closed circulation system which enables re-use of the WBM drilling fluids.

WBM drilling fluids that cannot be reused (e.g. due to bacterial deterioration or because 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. Opportunities to reuse the WBM drilling fluids at the end of the Petroleum Activities Program are reviewed across current Woodside drilling activities.

WBM may not be able to be reused between drilling sections due to the drilling sequence, technical requirements of the mud (i.e. no tolerance for deterioration of mud during storage) and maintenance of productivity/injectivity.

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

3.6.1.7 Non Water-Based Mud System (Contingency only)

The decision to use non water-based muds (NWBM) drilling fluids for the bottom hole sections of a particular well is based on various 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 but is not limited to consideration of environment, health, safety and waste management.

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. This depends on the conditions encountered while drilling. Where NWBM is used, the base oil will be a Group III synthetic oil (e.g. Saraline 185V), for this appraisal well.

The NWBM drilling fluid will be primarily mixed onshore (new or re-use 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 Solids Control Equipment (SCE), where the drill cuttings are removed before being pumped back to the pits ready for re-use. 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 prior to discharge with mud pit washings or returned to shore for disposal if discharge criteria cannot be achieved (refer to mud pits below).

3.6.1.8 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 completion of drilling and completions operations. Mud pit wash residue is operationally discharged with less than 1% oil contamination by volume. Mud pit residue over 1% oil by volume is sent to shore for disposal.

3.6.1.9 Drill Cuttings

Drill cuttings generated from the well are expected to range from very fine to very coarse (less than 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 **Table 6-14.**

The bottom hole sections will be 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 may comprise of, 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 NWBM is needed to drill a well section, the cuttings which are separated from the NWBM via the shakers will also pass through a cuttings dryer and associated SCE, to reduce the average oil on cuttings (only sections using NWBM) to 6.9% wt/wt or less on wet cuttings, prior to discharge.

3.6.2 Formation Evaluation

Formation evaluation is the interpretation of a combination of measurements taken inside a wellbore to detect and quantify rock quality and hydrocarbon presence adjacent to the well. Two sub-types of formation evaluation are to be used: Formation Evaluation While Drilling (FEWD) and Wireline logging. FEWD involves the use of logging tools as part of the drill string to gain a near-real-time understanding of the type of rock and fluid fill present without ceasing drilling according to its response to radioactive and electrical input. Typical tools may include Deep Directional Resistivity (DDR), gamma ray, resistivity, density, neutron, sonic and tools which can measure formation pressures. Wireline logging may occur in addition to FEWD and occurs after the drill string has been removed from the well. Wireline logging may include reservoir fluid sampling, formation pressure, extracting side-wall cores, gamma ray (GR), resistivity, density, sonic, spectral gammay ray, resistivity image, nmr, acoustic image and Casing Collar Locator (CCL) for depth correlation and an Ultrasonic Imaging Tool and Cement Bond Log to measure cement integrity, in addition to similar tools run for FEWD as required. Wireline contingency work will be carried out with appropriate isolation barriers in place, i.e. an overbalanced fluid column. If wireline work is required to take place in a live well, or where there is a risk of barrier failure, then the operation will be carried out with full pressure control equipment at the surface. Some FEWD and wireline tools might 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 impact or risk and are not assessed in **Sections 6**.

3.6.3 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 sometimes be left in place to act as a barrier. Suspension may be short term (e.g. in the case of a cyclone) or longer term (more than one year). On return to a well after suspension, the MODU reconnects to the well via the riser, and with BOP in place, barriers are removed and drilling activity resumes.

3.6.4 Cement, Barite and Bentonite Discharge

Excess cement, barite and bentonite (dry bulk) after well operations are completed, will either be held onboard and used for subsequent wells, provided to another operator at the end of the program, or discharged to the marine environment. Excess cement, barite and bentonite that does not meet technical requirements during the Petroleum Activities Program may also be bulk discharged to the environment. Bulk discharges of cement, barite and bentonite may occur as a slurry through the usual cement discharge line, or blown as dry bulk and discharged.

3.6.5 Underwater Acoustic Positioning

An array of long base line (LBL) transponders may be installed on the seabed as required to support drilling activities. The LBL array provides accurate positioning by measuring ranges to three or more transponders deployed at known locations on the seabed and structures.

An array of transponders is proposed within a radius of 500 m from the proposed location of the wells and will be in place for a period of about three months. 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).

During xmas tree installation activities ultra-short baseline transponders (USBL) may be installed on the seabed or mounted to the wellhead as required by the sub-sea installation activities. Transmissions from USBL transponders are similar to LBL transponders.

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 kilogram (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 are recovered by means of a hydrostatic release, which leaves the clump weight on the seabed. The transponders mounted on seabed frames will be removed by remotely operated vehicles (ROV).

3.6.6 Permanent Plugging Activities

The permanent plugging activities, including designing a permanent well barrier and installing the barriers, will be completed in accordance with the NOPSEMA accepted Well Operational Management Plan (WOMP) as required under the OPPGS (Resource Management and Administration) Regulations 2011.

Permanent plugging activities are to be conducted through the marine riser. This closed-circuit system results in no planned discharges directly to sea, as all fluids, cements and equipment are contained within the well bore and riser, and either permanently remain in the well or are returned to the MODU.

Once the formation pressure is controlled, permanent abandonment cement barriers will be installed and verified. If there is any excess cement, it is planned to be discharged after permanent plugging activities. The volume of this cement will be approximately 5 m^3.

3.7 Decommissioning Activities

The Petroleum Activities Program covers the decommissioning of the Julimar South-1 appraisal well. Well abandonment activities are to be conducted in accordance with Woodside's internal standards as part of the drilling campaign, as described in **Section 3.6.6**. Decommissioning of well infrastructure will be completed within the four-year life of this EP, with wellhead removed currently planned to be completed by about the end of 2025. The decommissioning scope involves a subsea support vessel returning to cut and remove the wellhead for appropriate disposal onshore, as described in **Section 3.11.1**.

3.7.1 Removal of Wellhead

The intention is that the wellhead and associated infrastructure are to be removed and recovered as part of the Petroleum Activities Program. Methods for removing and recovering the wellhead are described in **Table 3-4**. Infrastructure may be left in situ for up to four years following acceptance of this EP. This is considered to be acceptable, given:

- it will not affect the success of future removal
- there are no new or increased impacts or risks to the environment from infrastructure remaining *in situ* for this period until decommissioning.

This flexibility in the timing for removing and recovering infrastructure provides adequate time for execution planning and approval in accordance with Woodside's WMS processes, also the opportunity to campaign wellhead removal with other Woodside activities in the area. This is intended to reduce impacts and risks to the environment, such as reduced time and emissions and discharges across projects and reduced risk for dropped objects through additional feasibility assessment and will enable cost efficiencies. Furthermore, given the short lifespan of this activity, ongoing IMR activities are not expected to be required.

Table 3-4: Wellhead cutting methods

Method	Description	Associated Discharges	Preference
Abrasive water jet (AWJ) cutting	**Method** uses a system of high-pressure water entrained with grit and flocculant pumped via an umbilical from a vessel to a subsea cutting tool that is inserted into the inner well casing. Where possible, cut is made at sufficient depth below the mudline (more than 3 m) in accordance with international well standard practice, such as Oil and Gas UK Well Decommissioning Guidelines (Oil and Gas UK, 2018). This may also allow for additional cut attempts. **Uses:** Suitable where an internal cut can be achieved and within water depths shallower than approximately 300 to 350 m, due to requirement for high-pressure jetting. Not restricted by number of casing strings.	4 t of grit and 250 L flocculant per AWJ cut (majority or all to be released below the mudline).	Preferred method given water depth within the PAA.
External cutting using diamond wire saw	**Method:** Method uses a hydraulically driven motor and pulley system to operate an industrial diamond cutting wire via a vessel or ROV. **Uses:** Suitable for wells with multiple casing strings and within all water depths. May require up to 1 m of well infrastructure to be left *in situ* above seabed due to external cut or a small amount of sediment relocation to allow cut at the seabed. Limited global availability of saws large enough for wells where there is an external structure such as a temporary guide base. These structures would also require long cut duration and carry a lower likelihood of success.	N/A	Contingency method if preferred method is unsuccessful.
Mechanical internal cutting	**Method**: Method uses mechanical cutting knives that are inserted into the inner well casing and rotated. Where possible, cut is made at sufficient depth below the mudline (more than 3 m) in accordance with international well standard practice, such as Oil and Gas UK Well Decommissioning Guidelines (Oil and Gas UK, 2018). This may also allow for additional cut attempts. **Uses:** Suitable for wells with multiple casing strings where an internal cut can be achieved, and within all water depths.	N/A	Contingency method if improvements in technology allow it to become suitable for removal of guide bases.

Note: Removal of remaining infrastructure does not include any structures installed below the seabed. Should diamond wire saw be used to externally cut any wellhead, effort will be made to make this cut as close to the seabed as possible.

Once the wellhead is cut, the intention is that an ROV will be used to attach rigging to the infrastructure and crane deployed to recover equipment to the vessel deck. The infrastructure may be temporarily set down on the seabed in the immediate vicinity of the well to enable successful recovery. Once recovered, the infrastructure will be transported to shore for disposal and recycling.

Should the well infrastructure removal not be successful, Woodside will resubmit a revision of this EP which evaluates alternative decommissioning options for the Julimar South-1 well.

3.7.2 As-Left Survey

An as-left survey will be undertaken using an ROV following the completion of removal activities at the well. The survey is intended to confirm that all infrastructure above the mudline has been removed.

3.8 Survey Activities

3.8.1 Geophysical Survey

The objective of the geophysical survey is to describe the sea floor and sub-sea floor characteristics within the Survey Operational Area across WA-49-L, WA-5-R, WA-76-R and WA-526-P. The industry accepted techniques are outlined in **Table 3-5** described in the following sections will be adopted to achieve the objectives of the geophysical survey scope.

The geophysical survey techniques may occur anywhere within the Survey Operational Area.

Geophysical sources emit sound at a variety of intensities and frequencies depending on the resolution of information required. A summary of estimated source levels and operating frequencies for the proposed geophysical survey techniques is provided in **Table 3-5**.

Table 3-5: Acoustic source characteristics of geophysical survey techniques

Geophysical survey technique	Source peak pressure level ($L_{S,pk}$) (dB re 1 µPa m / dB re 1µPa @ 1 m)	Source sound pressure level ($L_{S,P}$) (dB re 1 µPa m / dB re 1µPa @ 1 m)	Source sound exposure level ($L_{S,E}$) (dB re 1 µPa^{2}m^{2}s / dB re 1µPa^2.s @ 1 m)	Frequency range (kHz)
MBES	N/A	210–245 [1, 2, 3]	173–188 [2]	The Petroleum Activity Program is expected to use approximately 150–300 kHz (hull mounted). Using AUV may be higher frequency due to proximity to seabed.
SSS	N/A	200–235 [1, 2]	200 [2]	75–900 [1, 2]
SBP – Chirp	198–218 [2, 4]	192–210 [2, 4]	171–193 [2, 4]	2–30 [1, 2, 4]
SBP – Boomer	210–217 [2, 4]	200–206 [2, 4]	175–180 [2, 4]	0.2–16 [2, 4]
SBP – Sparker	N/A	200–220 [1]	N/A	0.05–4 [1]
USBL	N/A	184–202 [1]	N/A	19–34 [1]

[1] Jimenez-Arranz et al. (2017)

[2] Zykov (2013)

[3] MacGillivray et al. (2013)

[4] McPherson and Wood (2017)

3.8.1.1 Multibeam Echo Sounder

Multibeam echo sounders (MBES), like other sonar systems, transmit sound energy and analyse the return signal (echo) from the seabed or other objects. The sound waves are transmitted from a transducer mounted on the hull of the survey vessel or Autonomous Underwater Vehicle (AUV) to produce a fan-shaped coverage of the seabed. The coverage area on the seabed depends on the equipment used, the settings of the equipment and the depth of the water. Typically, coverage is two

to four times the water depth (below the transducer). A summary of sound emitted from MBES, including proposed operating frequency and source intensity, is provided in **Table 3-5**.

3.8.1.2 Side Scan Sonar

Side scan sonar (SSS) is a hydro-acoustic technique. The sensor array comprises a set of transducers which are mounted on either side of a towfish or AUV. The transducers produce a high frequency pulse of sound energy which is formed into the shape of a fan that sweeps the seabed. The return signal (echo) comprises acoustic energy reflected from the seabed and waterborne discontinuities. The strength of the return echo is continuously recorded, creating an 'image' of the ocean bottom which can be used to indicate the texture of the seabed. A summary of sound emitted from SSS, including proposed operating frequency and source intensity, is provided in **Table 3-5**.

3.8.1.3 Sub Bottom Profiler

Sub bottom profilers (SBP) are devices for converting electrical energy (or mini airgun) into acoustic energy. They produce an acoustic profile which extends from the seabed down to the limit of penetration. Geophysical surveys use a variety of profilers which operate at differing energy levels and are characterised by different dominant frequencies. Higher energy sources are needed to transmit the acoustic signals to greater depth, but they have correspondingly lower dominant frequencies which reduce the resolution of the resultant record. Hence, the type of profiler used depends on the nature of the substrate, penetration and resolution required. SBP shall be collected using one system, being either Chirp, Boomer or Sparker. A summary of sound emitted from SBP systems, including proposed operating frequencies and source intensities, is provided in **Table 3-5.**

Chirp Sub Bottom Profiler

During the geophysical survey, the Chirp SBP system may be used. This system emits a sweep of frequency signals (transmitted electromagnetic signals over a period of time). The Chirp system also acts as a receiver for the reflected signal. The Chirp SBP may either be operated within the towfish or towed on the surface within a catamaran or AUV.

Boomer Sub Bottom Profiler

A Boomer SBP system may be used during the geophysical survey. The system consists of two spatially separated units; the Boomer plate acoustic source mounted within a catamaran, and a hydrophone receiver. These are both towed on the surface immediately astern of the vessel, usually on opposite sides.

The Boomer plate is an electro-mechanical transducer comprising an insulated electrical coil adjacent to a metal plate. A shipboard power supply generates an electrical pulse which is discharged to the electrical coil causing a magnetic field to repel a metal plate. This energetic motion generates a broad band, high amplitude impulsive acoustic signal in the water column that is directed vertically downward.

The hydrophone system consists of individual hydrophone elements located within neutrally buoyant synthetic hydrocarbon filled tubing (approximately 5 L). They typically contain eight to twelve hydrophone elements evenly spaced in a 2.5 to 4.5 m long, 25 mm diameter tube.

Sparker Sub Bottom Profiler

A Sparker SBP system may be used during the geophysical survey. The system consists of two spatially separated units; the Sparker array acoustic source mounted within a catamaran and a hydrophone receiver. These are both towed on the surface immediately astern of the vessel, usually on opposite sides.

The Sparker is an acoustic source which uses an electrical arc which momentarily vaporises water between positive and negative electrodes, producing an omni-directional acoustic pulse.

The hydrophone system consists of individual hydrophone elements located within neutrally buoyant synthetic hydrocarbon filled tubing (approximately 5 L). They typically contain 8 to 12 hydrophone elements evenly spaced in a 2.5 to 4.5 m long, 25 mm diameter tube.

3.8.1.4 Ultra Short Baseline

An Ultra Short Baseline (USBL) system will be used during the geophysical, geotechnical and environmental survey campaign. The USBL system is an underwater positioning system that incorporates surface positioning systems, usually global navigation satellite systems, and a vessel-mounted transceiver to provide the position of underwater equipment such as side scan sonar towfish and geotechnical testing and sampling equipment. A summary of sound emitted from USBL systems, including proposed operating frequency and source intensity, is provided in **Table 3-5.**

3.8.1.5 Geophysical Equipment Deployment

A variety of the systems described above may be used depending on seabed soil conditions and required penetration and resolution. Some of the systems act as the transmitter and receiver; others have a separate transmitter and a short hydrophone streamer as a receiver.

A survey vessel together with AUV, a towfish and/or catamaran will be used to deploy geophysical sources and collect data. Proposed deployment methods are summarised in **Table 3-6** and illustrated in **Figure 3-3** and **Figure 3-4**. Depending on the method of deployment, geophysical sources can sit at a variety of locations within the water column (**Table 3-6**), noting that only one type of deployment will be used.

Table 3-6: Proposed geophysical equipment deployment method

Geophysical survey technique	AUV	Towfish	Towed Catamaran	Towed	Hull mounted
MBES	□				□
SSS	□	□*			
USBL	□**			□**	□**
Sub Bottom Profiler					
SBP – Chirp	□	□			□
SBP – Boomer			□*		
SBP – Sparker			□*		

** Note - Towfish can also attach several acoustic sources including Side Scan Sonar or CHIRP.*

*** USBL has a hull mounted or towed transceiver*

Table 3-7: Proposed geophysical equipment deployment depth

Geophysical survey technique	AUV	Towfish	Towed Catamaran	Towed	Hull mounted
Deployment Depth	35 m above Seabed (nominal)	10-20 m above seabed	Within 1 m of surface	Dependent on draft of vessel (approximately 10 m)	Dependent on draft of vessel (approximately 10 m)

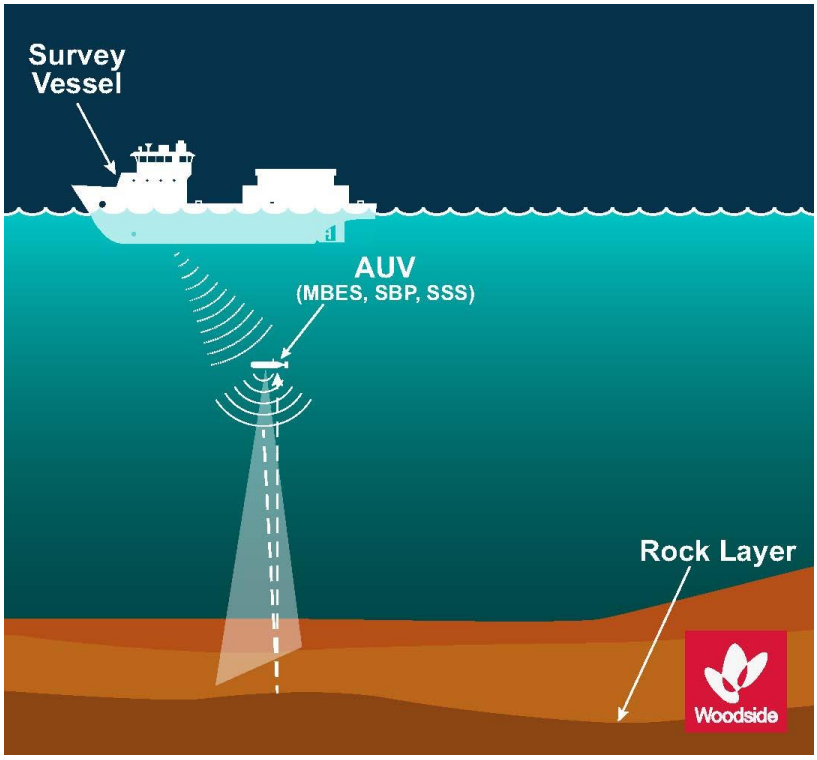


Figure 3-3: Deployment of geophysical equipment via AUV

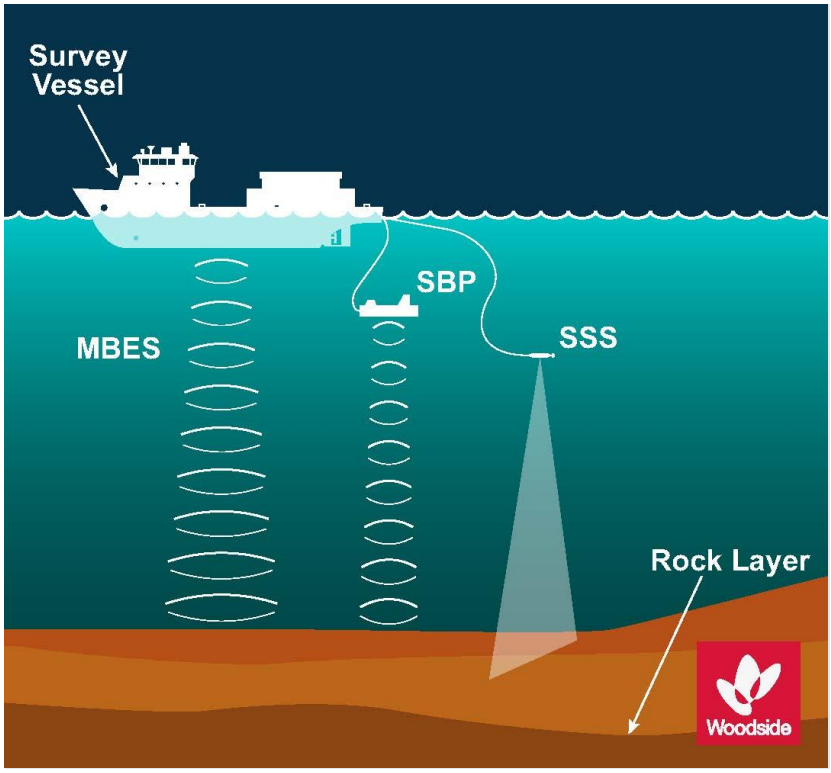


Figure 3-4: Deployment of geophysical equipment from a survey vessel

3.8.2 Geotechnical Site Survey

The geotechnical site survey will be performed using standard industry equipment and will consist of *in situ* testing and sample collection to ground truth the geophysical data and provide geotechnical data to characterise the geology below the seabed. Geotechnical sample locations will be determined on review of the geophysical survey results.

The geotechnical site survey includes the following:

- Penetration testing
- Drop core, piston core
- Box coring

3.8.2.1 Penetration testing

Penetration testing involves pushing a penetrometer (probe) into the seabed at a constant rate of penetration, and continuously measuring resistance, friction and water pressure. The Pore Cone Penetration Test (PCPT) is performed most frequently. A T-bar penetrometer test (TBT) and a Ball Penetrometer Test (BPT) will also be undertaken to continuously measure resistance, friction and water pressure during both the push-in and pull-out phases of the test.

When the required final penetration depth is reached, all equipment is withdrawn from the seabed. A small hole will remain in the seabed, which will eventually collapse and infill as surface sediments

move in the ocean current. For shallow penetrations, the hole will be proportional to the geometry of the penetrometer used:

- Piezocone penetrometers: approximately 25–40 millimetres (mm) (diameter)
- T-bar penetrometers: approximately 40 mm (nominal diameter) and 250 mm (breadth)
- Ball penetrometers: approximately 56–133 mm (diameter).

Approximately 16 PCPT profiles will be undertaken within the Survey Operational Area to a depth of up to 20 m below seabed and approximately 16 TBT or BPT to a depth of up to 20 m below seabed.

3.8.2.2 Drop core, Piston Core

Piston coring is normally used on soft, unconsolidated sediments. A piston corer is lowered by wire rope to the seabed, at approximately 1 m/s, so the duration of lowering and recovery operation is short (minutes at each site). It has a trigger device that hits the seabed before the core barrel and releases the corer allowing it to freefall. As the barrel enters the sediment, a special internal piston creates a vacuum and helps to draw the core into the barrel. Core catchers prevent the sediment from coming out of the coring tube. This suction reduces compaction of the sample in the inner sleeve. Sampling itself is of short duration, typically approximately 15 minutes at each location.

Approximately 15 cores to depths of ~3 m are proposed to be taken across the Survey Operational Area. Each core has a diameter of ~10 cm with a footprint of ~0.3 m^2.

3.8.2.3 Box coring

Box core samplers are designed to recover bulk, relatively undisturbed samples of soft surficial material. Box dimensions of 0.5 m by 0.5 m by 0.5 m are typically used for offshore geotechnical surveys. The box corer is mounted on a frame, which is lowered to the seabed. A self-releasing trigger mechanism, initiated once the frame reaches the seabed, allows the box corer to penetrate into the seabed. Penetration is limited by a stopper to ~0.5 m depth.

The volume of sample recovery is typically approximately 0.125 m^3. Samples will be collected from approximately 12 locations across WA-49-L, WA-5-R, WA-76-R and WA-526-P.

3.8.2.4 Anchor/Chain Hold Testing

Anchor/chain hold testing involves deploying and tensioning an anchor at proposed anchor locations to determine the performance and behaviour of the anchor. The results of the test will be used to generate equivalent anchor Ultimate Holding Capacity (UHC) values. These values would form inputs to a detailed MODU mooring design for future drilling campaigns that is compliant with industry and company standards.

Anchor/chain hold testing may consist of an anchor handling vessel (AHV) deploying an anchor at a potential future mooring location. The AHV would then apply tension on the anchor and log its performance based on hold tension, drag distance and embedment. The AHV will deploy drag embedment anchors designed to penetrate the seabed to a target penetration depth of approximately 15 m. Drag embedment anchors are suitable for the activity as they are designed to resist large horizontal loads (such as mooring a MODU). Ultra-short baselines (USBL) transponders will be attached to the anchors to assist with positioning.

Up to ten locations within the Survey Operational Area may be tested using an approximately fifteen tonne anchor and a section of chain alone. Therefore up to 20 anchor/chain deployments may be performed as part of this activity. An ROV may also be used to judge how deep the anchor has

embedded and independently verify the seabed condition. In total this work is anticipated to take approximately one week.

3.9 Project Vessels and Support Activities

Vessels used during the Petroleum Activities Program may include a MODU, survey vessel, subsea support vessl for decommissioning activities (e.g.Mobile Offshore Unit, Well Intervention Vessel or IMR vessel) and a refuelling vessel. Other vessels are likely to be used to support MODU and vessel operations including general support vessel(s) and anchor handling vessel(s).

Vessels may mobilise from the nearest Australian port or directly from international waters to the Petroleum Activity Area (PAA), in accordance with biosecurity and marine assurance requirements.

All project vessels are subject to the Marine Offshore Vessel Assurance procedure which is detailed in Implementation **Section 7.5.2.3**.

3.9.1 Drilling Vessel

The Petroleum Activities Program will be drilled by a moored MODU. Typical specifications for these MODU types are provided in **Table 3-8**. 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 3-8: Typical moored MODU specification ranges (Ocean Apex)

Component	Specification Range
Rig type/design/class	Semi-submersible MODU
Accommodation	120 to 200 personnel (maximum persons on board)
Station keeping	Eight-point or twelve point mooring system
Bulk mud and cement storage capacity	283 to 770 m^3
Liquid mud storage capacity	576 to 2500 m^3
Fuel oil storage capacity	966 to 1400 m^3
Drill water storage capacity	3500 m^3

3.9.2 Survey Vessels

The specific vessel/s to undertake both the geophysical and geotechnical surveys are yet to be confirmed.

The geophysical survey may be done using general purpose survey vessels approximately 30–80 m long. The intention is that the Anchor/Chain Hold Testing scope will be completed by an anchor handling vessel (AHV) that has a specialised design to handle large anchors and the anchor chain/wire in an offshore environment. AHV will likely be ~90 m long. The rest of the geotechnical site survey is planned to be conducted using either a drillship or a remotely operated seabed drill system launched and recovered from a general purpose survey vessel. Collectively, these will be referred to as survey vessels throughout the EP. Each survey activity will require only one vessel, the surveys may be run concurrently or sequentially.

Vessel speeds during the survey will typically be very low, travelling at approximately 4 knots during geophysical data acquisition and maintaining position using dynamic positioning (DP) during geotechnical sampling.

Vessels will mobilise and demobilise either from international waters or domestically from within Australia and will comply with the relevant maritime safety requirements and marine order requirements as appropriate for the vessel.

No crew changes or helicopter transfers are anticipated however, crew changes via a port call may be required in the event of weather delays such as multiple cyclones. No bunkering at sea will be performed. Any bunkering will be performed during a port call and is out of the scope of this EP. No anchoring of the survey vessels, other than the anchor hold testing vessel, is planned.

For power generation, vessels may use diesel-powered generators and/or LNG. All vessels will display navigational lighting and external lighting, as required for safe operations. Lighting levels will be determined primarily by operational safety and navigational requirements under relevant legislation, specifically the Navigation Act 2012. The vessels will be lit to maintain operational safety on a 24-hour basis.

All vessels are subject to the Marine Offshore Assurance process and review of the Offshore Vessel Inspection Database (OVID). All required audits and inspections will assess compliance with the laws of the international shipping industry, which includes safety and environmental management requirements, and maritime legislation including International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL) and other International Maritime Organization (IMO) standards.

3.9.3 Decommissioning Vessel

The wellhead removal scope may be completed by a Mobile Offshore Unit (MOU), Well Intervention Vessel (WIV), or a subsea support vessel (i.e. general purpose IMR vessel). Typical specifications for these vessels are provided in **Table 3-9** and **Table 3-10**. These are collectively referred to as the decommissioning vessel for the remainder of the document, unless specific risks for different decommissioning vessel types have been identified.

Table 3-9: Example DP MOU/WIV specifications

Component	Specification Range
Rig type / Design / Class	Ultra deepwater semi-submersible WIV
Accommodation	140 persons
Station keeping	Dynamically positioned (Class 3)
Fuel oil storage capacity	1,799 m^3
Brine storage capacity	321 m^3

Table 3-10: Example subsea support vessel specifications

Component	Specification Range	
	Sapura Constructor	***Far Saracen***
Type/Design/Class	IMR vessel	AHV
Accommodation (maximum persons on board)	~120 personnel	~40 personnel
Station keeping	DP2	DP2
Fuel (@ 90% capacity)	~1006 m^3	~998 m^3
Lube oil storage capacity	~35 m^2	~20 m^3

3.9.4 Support and Other Vessels

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

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. Cement, barite and bentonite are transported as dry bulk to the MODU by support vessels and pneumatically blown to the MODU storage tanks using compressed air. 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.

For power generation, vessels may use diesel-powered generators and/or LNG. All vessels will display navigational lighting and external lighting, as required for safe operations. Lighting levels will be determined primarily by operational safety and navigational requirements under relevant legislation, specifically the Navigation Act 2012. The MODU and support vessels will be lit to maintain operational safety on a 24-hour basis.

Standby duties may include, but are not limited to, periods of helicopter operations and working over the side activities while in the field.

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 at the sea surface at potentially a higher temperature. Alternately, MODUs may use closed loop cooling systems.

Potable water, primarily for accommodation and associated domestic areas, may be generated on vessels using a reverse osmosis (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, or may be incinerated where permissible.

Support vessels do not anchor within the PAA during the activities due to water depth; therefore, these support vessels will utilise DP.

The support vessels are also available to assist in implementation of the Julimar Appraisal Drilling and Surveys Oil Pollution First Strike Plan (FSP), should an environmental incident occur (e.g. spills).

3.9.5 Station Keeping: Mooring Installation

Mooring uses a system of chains/wires and anchors, which may be pre-laid before the MODU arrives at the location, to maintain position when drilling. A mooring analysis will be undertaken to determine the appropriate mooring system for the Petroleum Activities Program. The mooring analysis will identify whether the mooring system will be pre-laid or set by the MODU, define proof tension values, and evaluate whether synthetic fibre mooring ropes are required. A pre-laid system can generally withstand higher sea states compared to a system that only uses the MODUs mooring chain/equipment and can also save the time in establishing anchors.

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

Soil analysis may also be necessary to provide data on composition and rock/substrate strength as input into the mooring design and 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.

Suction piling may be required as a contingent activity and will be reviewed with the MODU contractor.

3.9.6 Refuelling

The MODU will be refuelled via support vessels approximately once a month or as required. Refuelling will take place within the PAA of the well being drilled at the time and has been included in the risk assessment for this EP. Other fuel transfers that may occur on board the MODU may include refuelling of cranes, helicopters or other equipment as required.

3.9.7 Helicopter Operations

During the Petroleum Activities Program, crew changes will be undertaken using helicopters as required. Helicopters are the primary means of transporting passengers and/or urgent freight to/from the activity. 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.

3.9.8 ROV Operations

The MODU, AHV, decommissioning vessel and support vessels may be equipped with a 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:

- pre-drill seabed and hazard survey
- transponder deployment blowout preventer (BOP) land-out and recovery
- BOP well control contingency
- visual observations at seabed during riserless drilling operation
- pre and post installation survey
- installation and testing of subsea infrastructure
- anchor/chain hold testing inspection

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 will be fitted with hydraulically driven tools to facilitate flowline tie-in.

An ROV may also be used in the event of an incident for the deployment of the Subsea First Response Toolkit. This is discussed further in **Appendix D**.

3.10 Contingent Activities

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

3.10.1 Respud

A respud may be required for a number of reasons, such as if the conductor or well head slumps or fails installation criteria (typically during top hole drilling). Respudding involves moving the MODU to a suitably close location (e.g. about 25m - 250 m from the original location) to recommence drilling. A respud activity would result in repeating top-hole drilling (**Section 3.9.1**).

The environmental aspects of respudding are the same as those for drilling and are considered to be adequately addressed by this EP, with no significant changes to existing environmental risks or any additional environmental risks likely. The net environmental effect will be limited to a potential increase in the volume of cuttings generated (**Table 6-14**) 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.

3.10.2 Sidetrack

A sidetrack may be required instead of a respud if operational issues are encountered. The environmental aspects of a sidetrack well are the same as those for routine drilling activities, which are considered to be adequately addressed by this EP (**Section 6**), 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 (**Table 6-14**), potential increase in the use of drilling fluids, and the additional emissions (atmospheric and waste) associated with an extended drilling program.

3.10.3 Emergency Disconnect Sequence

An Emergency Disconnect Sequence (EDS) may be implemented if the intervention vessel/ MODU is required to rapidly disengage from the well. The EDS closes the BOP (i.e. shutting in the well) and disconnects the riser to break the conduit between the BOP and MODU. Common examples of when this system may be initiated include when the MODU moves outside of its operating circle (e.g. failure of one or more of the moorings) or moves to avoid a vessel collision (e.g. third-party vessel on collision course with the MODU). The EDS aims to leave the well in a secure condition but will result in the loss of the fluids in the riser after disconnection.

3.10.4 Temporary Well Suspension

During permanent plugging activities, a well may need to be temporarily suspended (e.g. in the case of adverse weather or unexpected well outcomes requiring additional time to plan the next operation). Temporary well suspension activities are detailed in **Section 3.6.3.**

3.10.5 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. Plug and abandonment activities would be undertaken as outlined in **Section 3.6.6**, but the wellhead 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 are considered to be adequately addressed by this EP

(**Section 6**), with no significant changes to existing environmental risks or any additional environmental risks likely. Decommissioning of the Julimar South-1 appraisal wellhead assembly is described in **Section 3.7.**

3.10.6 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.

3.10.7 Venting

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

3.10.8 Contingent Permanent Plugging Activities

3.10.8.1 Deployment of Mud Mats

If well infrastructure is required to be removed to allow connection of the BOP directly to the wellheads to perform permanent plugging activities, mud mats may be required to temporally place infrastructure on the seafloor.

Mud mats are used to provide stability to wet parked structures due to the nature of the seafloor sediments. The carbon steel mud mat will likely be deployed by the decommissioning vessel and is approximately 3.5 m x 3.5 m in size. The mud mat, if deployed, will be recovered with the infrastructure by a subsea support vessel, following completion of the plugging activities.

3.10.8.2 Blowout Preventer Tether

To manage wellhead fatigue during permanent plugging activities, a BOP tether system may be used to limit BOP movement. A typical BOP tether system uses four to six clump weights, weighing about 25-45 tonnes with a footprint of 3 m x 4 m per weight. The final number and weight of the clump weights may differ depending on seabed and current conditions. These clump weights are deployed to the seabed about 20 to 40 m away from the wellhead, usually from an AHV. An ROV will then connect tethers between the clump weights and the BOP, which are subsequently tensioned to limit BOP movement. Clump weights used for the activity will be recovered after the activity along with any pre-laid moorings and may take up to two months to remove. Suction piles may be used instead of clump weights, with typically four 160 inch diameter piles used per tether system.

3.10.8.3 Milling

Casing or tubing liners may need to be removed either by cutting and pulling or milling, if the cement on the outside of the casing does not meet well barrier requirements. These operations are done through the marine riser with milling debris returned to the MODU and will only be performed if needed.

Milling operations involve removing steel casing, annulus cement and formation to expose fresh formation. The methods used include milling tools that create chips or ribbons of steel (swarf), chips of cement and chips of formation. Milling is typically performed at a controlled rate (1 to 1.5 m/hr), to enable steel swarf to be removed effectively from the milling site to minimise the risk of ‘birds nesting’

of steel swarf, which may block fluid returns and jam equipment. Milling tools become worn during milling operations and will require tripping for new/redressing about every 30 to 50 m.

As a result, the rate of milling is slower than normal drilling operations. As the steel swarf within the milled fluids is hard and sharp, these fluids from the well will not be processed through drilling muds process equipment such as cuttings driers and centrifuges, because they will damage or excessively wear the equipment. The milling fluids, including up to an additional 14 m^3 of swarf, 6 m^3 of drilled cement and 8 m^3 of formation rock, will be discharged overboard per 100 m interval if milling is required. As a result of restricted milling speeds, the rate of swarf and cement will be generated over several days (the rate is expected to be about 50 m per 18 hours).

3.11 Waste Generated from the Petroleum Activities Program

Woodside is committed to the re-use, repurposing and recycling of as much of our decommissioned infrastructure as practicable. Any wastes generated during the petroleum activities program, including the recovery of the wellheads, will be disposed of in accordance with a waste management plan. The waste management plan will apply the following waste management hierarchy in order minimise the amount of waste entering landfill:

- Reuse
- Repurpose
- Recycle
- Landfill

All waste streams will be classified and managed in accordance with applicable legislative requirements, or in accordance with international guidance where applicable, for example:

- *Hazardous Waste (Regulation of Exports and Imports) Act 1989 (Cth)* which implements the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- Environmental Protection (Controlled Waste) Regulations 2004 (WA)
- MARPOL: International Convention for the Prevention of Pollution from Ships
- International Finance Corporation: EHS Guidelines: Environmental Waste Management.

Generated wastes may be broadly classified into one of three categories:

- General non-hazardous solid wastes: Non-hazardous solid wastes produced on project vessels include cardboard, plastic, aluminium and paper. These waste materials will be stored on board the project vessels in suitable containers (segregated from hazardous waste materials) for transport back to shore for disposal/recycling in accordance with local regulations. Non-hazardous wastes may be incinerated onboard, eliminating the requirement for onshore disposal.
- Hazardous solid and liquid wastes: Hazardous wastes are defined as materials that are harmful to human health or the environment and include waste prescribed in the *Hazardous Waste (Regulation of Exports and Imports) Act 1989 (Cth) and Environmental Protection (Controlled Waste) Regulations 2004 (WA).* Hazardous wastes stored on vessels may include:
  - lubricating oils, hydraulic fluids, cleaning and cooling agents
  - oil filters and batteries
  - oily rags

- paint, aerosol cans
- medical wastes
- acids/caustics and solvents

All hazardous waste generated will be documented and tracked, segregated from other waste streams and stored in suitable containers. Recyclable hazardous wastes, such as oils and batteries, will be stored separately from non-recyclable materials. All of these wastes are disposed of onshore at a licensed facility.

- Decommissioned infrastructure generated from the Petroleum Activities Program which include:
  - Mild steel recovered from one wellhead and associated infrastructure (i.e. PGB, TGB and corrosion caps) (~7500 kg).

Disposal of the wellheads is described in **Section 3.11.1.**

3.11.1 Disposal of Recovered Wellhead

Woodside will engage a suitably experienced subcontractor for the disposal of the recovered wellhead. Recovered infrastructure is intended to be managed through the projects contracting strategy which is likely to include an infrastructure disposal strategy where waste management solutions will be assessed against the principles of the waste management hierarchy. The selected contractor will be:

- Experienced in the handling and disposal of analogous infrastructure; and
- Hold necessary licences and permits to ensure the work is undertaken in accordance with applicable legislative requirements.

The dismantling and disposal of the wellhead is anticipated to be completed within about 12 months of the wellhead arriving at the receiving port and waste management facility, however exact timing will be determined in consultation with the appropriately licenced project waste subcontractor.

The composition of the wellheads to be used is presented in **Table 3-11** and will be predominantly mild steel. It is expected that there will be no NORMS or mercury contamination on the wellheads, as the Julimar South-1 well would have been used for appraisal purposes only and never produced hydrocarbons.

Woodside anticipates the majority of the wellhead and associated infrastructure will be suitable for recycling or repurposing, resulting in the expected percentage of waste entering landfill to be less than about 5%. There are not expected to be any reuse opportunities for the wellheads. Factors such as design, age of structure, potential fatigue due to the initial drilling and installation process mean that reuse is not expected to be feasible.

Table 3-11: Typical Specifications for Wellheads

Project Waste Type	Composition	Indicative Weight (tonnes)	Waste End State
Wellheads and associated infrastructure	Mild Steel	10t per wellhead	Recycle
	Surface coatings and paints	3 – 5 kg per wellhead	Recycle
	Elastomeric Materials	750 g per wellhead	Landfill

4 DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 Overview

In accordance with Regulations 13(2) and 13(3) of the Environment Regulations, this section describes the existing environment that may be affected by the activity (planned and unplanned, as described in **Section 3**), including details of the particular relevant values and sensitivities of the environment, which were used for the risk assessment.

The Environment that May Be Affected (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 from either a loss of well control, or from vessel collision. The ecological impact thresholds used to delineate the EMBA are defined in **Section 6.8.1**.

Woodside recognises that hydrocarbons may be visible beyond the EMBA at lower concentrations than the ecological impact thresholds defined in **Section 6.8.1**. 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. For this EP, the socio-cultural EMBA for surface hydrocarbons encompasses an area fully within the boundaries of the EMBA for ecological impacts. 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 multiple spill scenarios (loss of well control and vessel collision) over 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 EMBA for surface and in-water

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.	NA
Dissolved	50 ppb This represents potential toxic effects, particularly sublethal effects to highly sensitive species (NOPSEMA guidance note: 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 guidance note: A652993, April 2019). This area

Hydrocarbon Type	EMBA[1]	Socio-cultural EMBA[1]	Planning Area for Scientific Monitoring
Entrained	100 ppb This represents potential toxic effects, particularly sublethal effects to highly sensitive species (NOPSEMA guidance note: 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.		is described further in **Appendix D**: **Figure 4-1**. In the event of a spill, DNP will be notified of AMPs which may be contacted by hydrocarbons at this threshold (**Table 5-1**).
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 6.8.1***

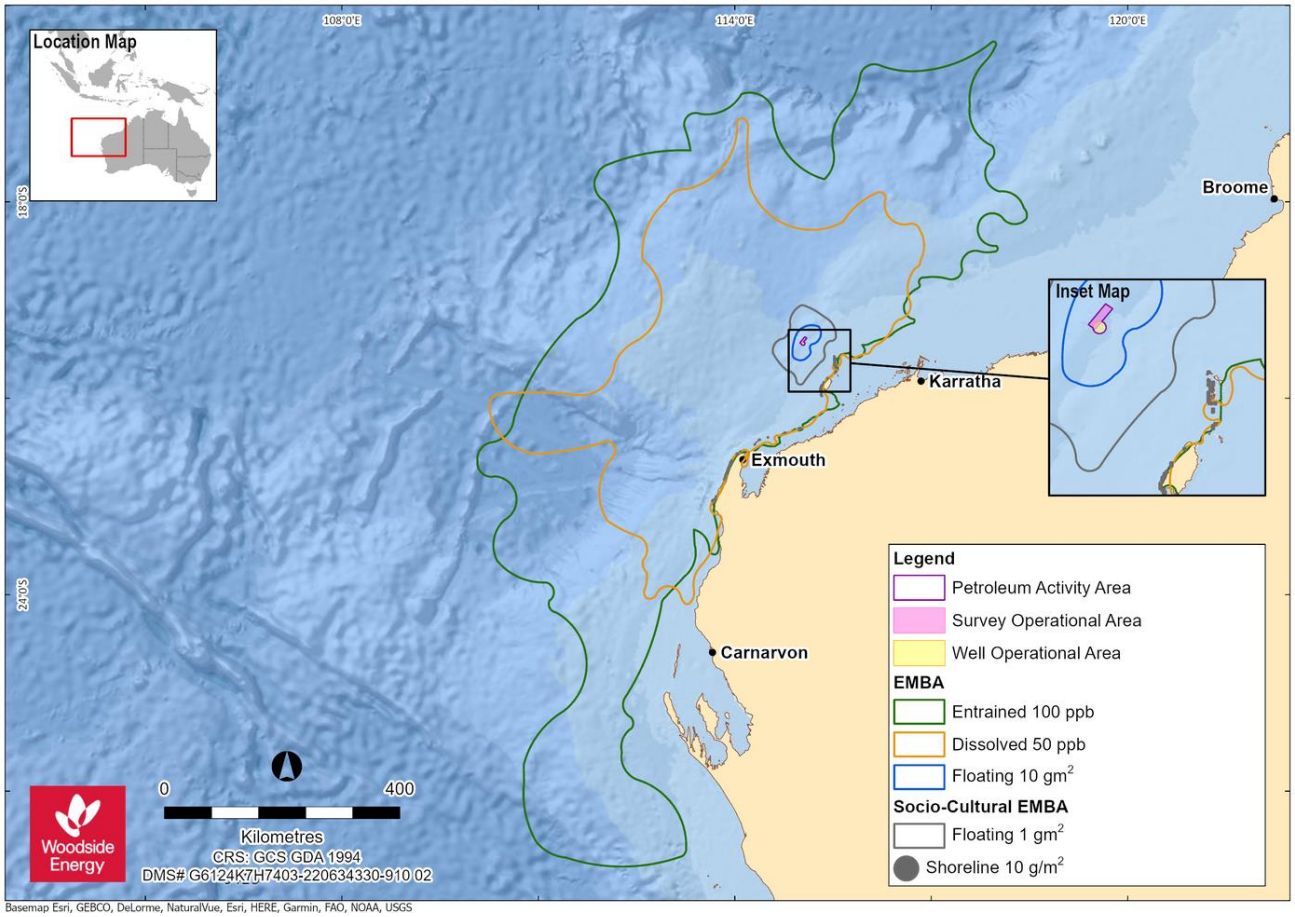


Figure 4-1: Environment that May Be Affected by the Petroleum Activities Program

4.2 Regional Context

The PAA occurs in Commonwealth waters off the north-west coast of Western Australia (WA), located in the North-west Marine Bioregion (NWMR) (IMCRA 4.0). Within the NWMR, the PAA lies within the Northern Carnarvon Basin on the Exmouth Plateau, about 179 km offshore from Dampier. The PAA overlaps with the Northwest Province and Northwest Shelf Province. The EMBA occurs in the NWMR and the South-west Marine Region (SWMR) (IMCRA 4.0) (**Figure 4-2**). The EMBA overlaps with the Timor Province, Northwest Province, Northwest Shelf Transition, Northwest Transition, Northwest Shelf Province, Central Western Transition, Central Western Shelf Transition, Central Western Shelf Province, Central Western Province and Southwest Shelf Transition. Woodside's Description of Existing Environment (**Appendix I**) summarises the characteristics for the relevant marine bioregions.

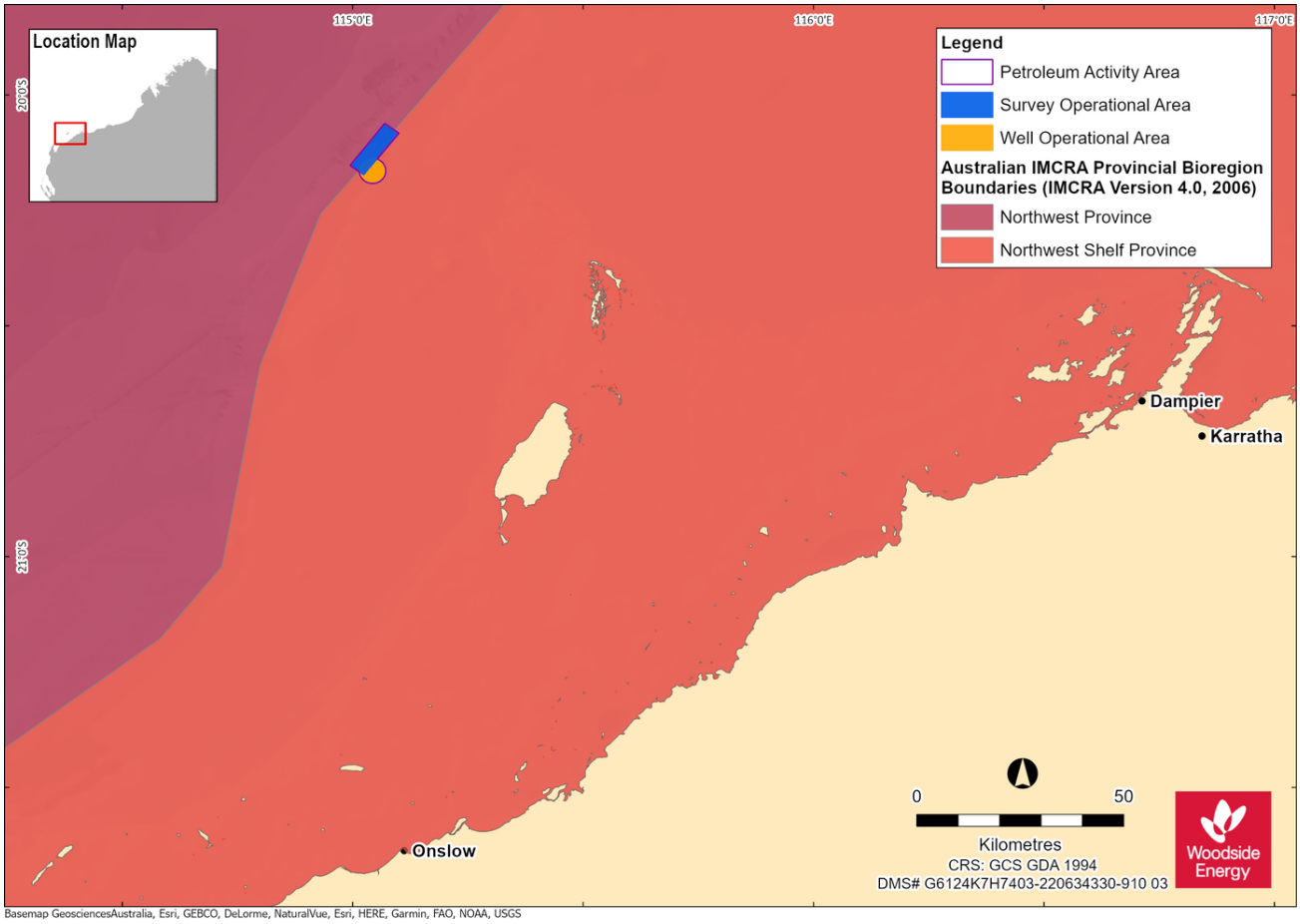


Figure 4-2: Location of the PAA and relevant marine bioregions

4.3 Matters of National Environmental Significance (EPBC Act)

Table 4-2 and **Table 4-3** summarise the matters of national environmental significance (MNES) overlapping the PAA and EMBA, respectively, according to Protected Matters Search Tool (PMST) results (**Appendix C**). 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 are provided in subsequent sections of this chapter and described in detail in **Appendix I**.

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

MNES	Number	Relevant Section
World Heritage Properties	0	**Section 4.9.1**
National Heritage Places	0	**Section 4.9.1**
Wetlands of International Importance (Ramsar)	0	**Section 4.9.1**
Commonwealth Marine Area	1	**Section 4.2**
Listed Threatened Ecological Communities	0	**Section 4.5**
Listed Threatened Species	22	**Section 4.6**
Listed Conservation Dependent Species	2	**Section 4.6**
Listed Migratory Species	36	**Section 4.6**

Table 4-3: Summary of MNES identified by the EPBC Act PMST as potentially occurring within the EMBA

MNES	Number	Relevant Section
World Heritage Properties	2	**Section 4.9.1**
National Heritage Places	6	**Section 4.9.1**
Wetlands of International Importance (Ramsar)	0	**Section 4.9.1**
Commonwealth Marine Area	3	**Section 4.2**
Listed Threatened Ecological Communities	2	**Section 4.5**
Listed Threatened Species	47	**Section 4.6**
Listed Conservation Dependent Species	3	**Section 4.6**
Listed Migratory Species	85	**Section 4.6**

4.4 Physical Environment

Key features of the physical environment are summarised in **Table 4-4** and described in further detail in **Section 6.3** of the Master Existing Environment.

Table 4-4: Summary of the characteristics of the physical environment relevant to the PAA and EMBA.

Physical Characteristic	Relevance to the PAA and EMBA
Bathymetry and geomorphology	The PAA is located in waters about 130–290 m deep on the middle continental shelf. The seabed is relatively flat, sloping toward the north-west of the PAA. Several deep-sea geomorphic features in the form of abyssal plains, marginal plateaus and sub-marine canyons provide broad-scale, biologically important seabed habitat in the EMBA.
Climate	The climate of the NWMR is dry tropical, exhibiting a hot summer season from October to April and a milder winter season between May and September (Bureau of Meteorology (BoM), 2012). There are often distinct transition periods between the summer and winter regimes, which are characterised by periods of relatively low winds (Pearce et al., 2003).
Oceanography	Tides in the NWS region are semi-diurnal and have a pronounced spring-neap cycle, with tidal currents flooding towards the south-east and ebbing towards the north-west (Pearce et al., 2003). The region exhibits a considerable range in tidal height, from microtidal ranges (<2 m) south-west of Barrow Island to macrotidal (>6 m) north of Broome (Holloway, 1983; Brewer et al., 2007). Storm surges and

	cyclonic events can also significantly raise sea levels above predicted tidal heights (Pearce et al., 2003). In addition to the synoptic-scale current dynamics, tidally-driven currents are a significant component of water movement along the NWS. Wind-driven currents become dominant during the neap tide (Pearce et al., 2003).
Seawater Characteristics	The offshore oceanic seawater characteristics of the NWS exhibit seasonal and water depth variation in temperature and salinity, being greatly influenced by major currents in the region. Surface waters are relatively warm year round due to the tropical water supplied by the Indonesian Throughflow (ITF) and the Leeuwin Current, with temperatures reaching 30 °C in summer and dropping to 22 °C in winter (Pearce et al., 2003). Variation in surface salinity along the NWS throughout the year is minimal (between 35.2 and 35.7 PSU), with slight increases occurring during the summer months due to intense coastal evaporation (Pearce et al., 2003; James et al., 2004).
Marine Sediment	A benthic survey conducted as part of the Julimar Operations EP (directly adjacent to the PAA) found that the area is dominated by soft sediment (fine to coarse sands) (Neptune Geomatics, 2010; RPS, 2010, 2011a). Sediments of the NWMR (and within the EMBA) are comprised of bio-clastic, calcareous and organogenic sediments (Baker et al., 2008). On the continental shelf, sediment is primarily sand and gravels, while the slope and deep ocean seabed is primarily mud.
Air quality	There is a lack of air quality data for the offshore NWS air shed. Studies have been undertaken for the nearshore Pilbara environment to monitor known sources of potential air pollution for locations such as the Burrup Peninsula and Port Hedland, but no monitoring is undertaken offshore. Due to the extent of the open ocean area and the activities that are currently performed, the ambient air quality in the PAA and wider offshore region is considered to be of high quality.

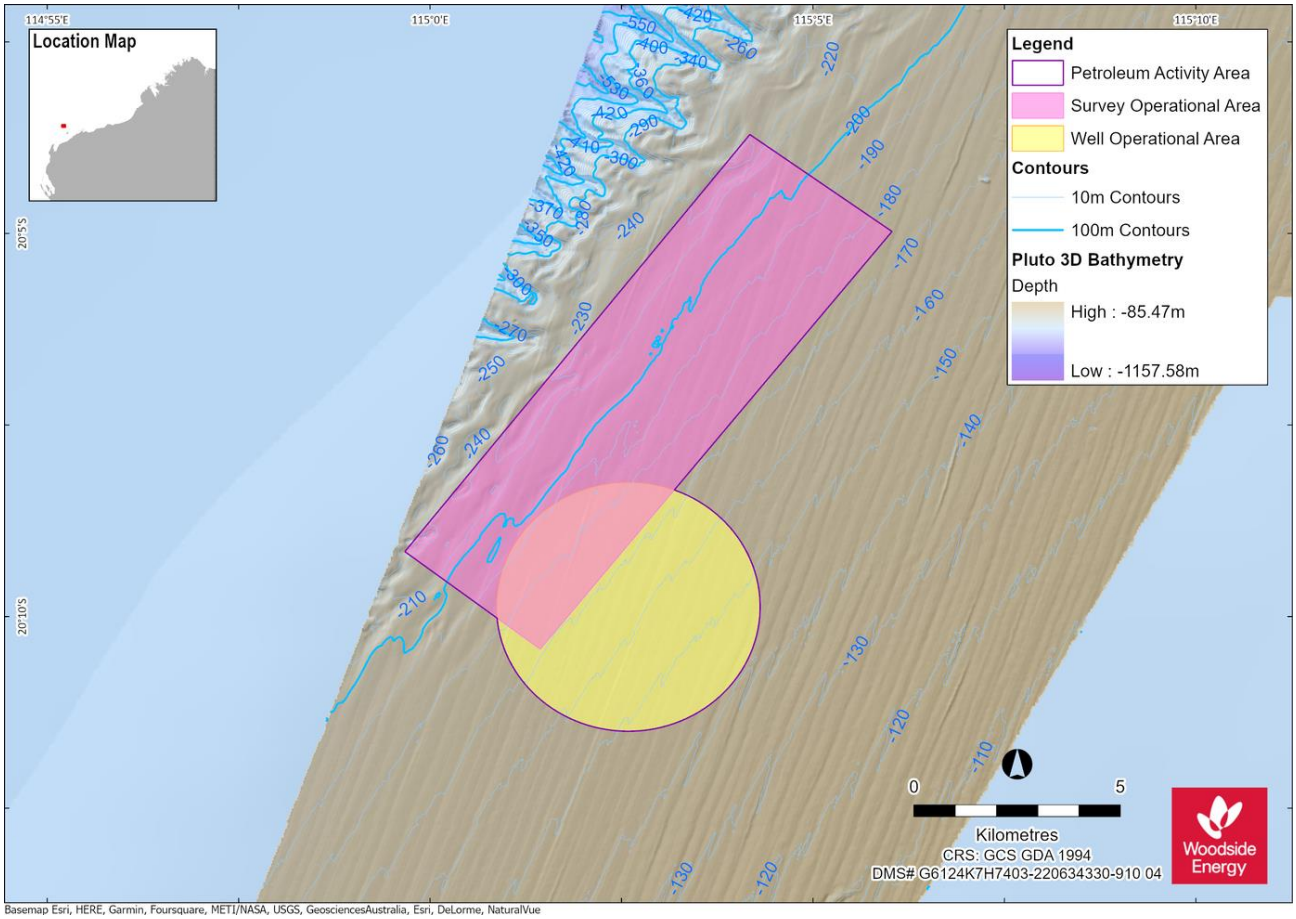


Figure 4-3: Bathymetry of the PAA

4.5 Habitats and Biological Communities

The seafloor of the PAA is likely to consist of soft sediment seabed habitat, characterised by sparse epifauna and infauna. A survey of the nearby Balnaves Development seafloor recorded sparse (< 5% cover) epibenthic fauna such as anemones, urchins, sea whips, sea pens feathers stars and glass sponges (RPS, 2011b). Infauna consisted of polychaetes and crustaceans. Similarly, the benthic habitats communities at the nearby Pluto Platform (30 km north-east of the PAA) are characterised as consisting of a sparsely abundant community of infauna (polychaetes, nemerteans, sipunculids and crustaceans) (SKM, 2006).

These results correlate with other NWS sampling programs, and indicate a widespread and well represented infauna assemblage along the continental shelf and upper slopes (Rainer, 1991; Le Provost et al., 2000; Woodside, 2004; Brewer et al., 2007). It is likely that the sea floor of the PAA will feature similar distribution and diversity of epifauna and infauna. Additionally, it is expected that the infaunal and epifaunal communities are widely represented in the EMBA

Key habitats and ecological communities within the EMBA are identified in **Table 4-5** and described in **Appendix I**

Table 4-5: Habitats and communities within the PAA and EMBA

Habitat/Community	Key locations within the PAA and EMBA
Benthic communities	
Bare/unconsolidated sediments	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.
Epifauna and Infauna	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.
Corals	Coral reef habitats have a high diversity of corals and associated fish and other species of both commercial and conservation importance. Coral reef habitats are an integral part of the marine environment within the NWMR. The nearest coral reef habitat to the PAA is located at Montebello Islands, about 42 km east. Other coral reef habitats in the EMBA include Barrow/Lowendal Islands Group, Muiron Islands, Ningaloo Coast and Shark Bay.
Macroalgae & seagrass	Seagrass beds and macroalgae habitats represent a food source for many marine species and also provide key habitats and nursery grounds (Department of Fisheries (DoF), 2011a). Seagrass beds and macroalgae habitats are present in several locations within the North-West Shelf Province. The nearest to the PAA, and within the EMBA, are about 42 km east at the Montebello/Barrow/Lowendal Islands Group, where macroalgae is the dominant macrophyte and occupies about 40% of the benthic habitat cover (Marine Parks and Reserves Authority (MPRA), 2007). Seagrass beds and macroalgae habitat can also be found in the EMBA at some islands within the Muiron Islands, Ningaloo Coast and Shark Bay.
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 and NWMR.
Banks & Shoals	Shoals are a significant habitat within the EMBA, and a number of submerged banks and shoals are located throughout the Southern Pilbara Island group (e.g. Outrim Patches, Penguin Bank). Key shoals include Rankin Bank, located 62km north east of the PAA.
Offshore reefs and islands	Within the EMBA key reefs and islands include: Montebello/Barrow/Lowendal Islands ~ 42 km east of PAA Thevenard Island ~ 137 km south of PAA Muiron Island ~ 167 km south west of PAA
WA coastline communities	The WA mainland coastlines occurs within the wider EMBA, predominantly along the Ningaloo and Cape Range coastline. The nearshore and coastal environments of Ningaloo on the WA coastline are approximately 185 km from the PAA. Communities include sandy beaches, mangroves and rocky shores.
Other habitats and communities	
Plankton	Phytoplankton within the PAA is generally expected to reflect the conditions of the NWMR. Primary productivity of the NWMR appears to be largely driven by offshore influences (as reported by Brewer et al., 2007), with periodic upwelling events and cyclonic influences driving coastal productivity with nutrient recycling and advection. There is a tendency for offshore phytoplankton communities in the NWMR to be

	characterised by smaller taxa (e.g. bacteria), whereas shelf waters are dominated by larger taxa such as diatoms (Hanson et al., 2007). Zooplankton within the PAA 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 & Gilmour, 2008; Simpson et al., 1993) and fish larvae abundance can occur throughout the year. Within the EMBA, peak primary productivity occurs in late summer/early autumn along the shelf edge of the Ningaloo Reef. It also links to a larger biologically productive period in the area that includes mass coral spawning events, peaks in zooplankton and fish larvae abundance (MPRA, 2005) with periodic upwelling throughout the year.
Pelagic and demersal fish communities	Free swimming pelagic fish within the PAA and EMBA are expected to include small pelagic fishes, broadly distributed throughout the tropical pelagic environment. Larger pelagic fish include migratory species (e.g. tunas, sharks etc.) as well as commercially important species.

4.6 Protected Species

A total of 99 EPBC Act listed species considered to be MNES (listed threatened or migratory) 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) and species that are unlikely to be present, based on a desktop review. Two conservation dependent species have also been identified with a potential to occur within the PAA and three in the wider EMBA.

Species identified as potentially occurring within the PAA and EMBA and Biologically Important Areas (BIAs) or Habitat Critical to their Survival (Habitat Critical) that overlap the PAA and EMBA are listed in **Table 4-6** to **Table 4-14**, and a description of species is included in **Appendix I**. **Figure 4-4** to **Figure 4-9** to Figure 4-9 show the spatial overlap with relevant BIAs and Habitat Critical areas and the PAA.

4.6.1 Fish, Sharks and Rays

Table 4-6: Threatened and Migratory fish, shark and ray species predicted to occur within the PAA and EMBA

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Carcharodon carcharias	White shark, great white shark	Vulnerable	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Carcharias taurus (west coast population)	Grey nurse shark	Vulnerable	N/A	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Pristis clavata	Dwarf sawfish	Vulnerable	Migratory	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Pristis pristis	Freshwater sawfish	Vulnerable	Migratory	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Pristis zijsron	Green sawfish	Vulnerable	Migratory	Species or species habitat known to occur within area	Species or species habitat known to occur within area
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
Sphyrna lewini	Scalloped hammerhead shark	Conservation Dependent	N/A	Species or species habitat likely 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

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Isurus oxyrinchus	Shortfin mako, mako shark	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Isurus paucus	Longfin mako shark	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Manta birostris (recently revised taxonomy *Mobula birostris* [White et al., 2017])	Giant manta ray	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
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
Anoxypristis cuspidata	Narrow sawfish	N/A	Migratory	Species or species habitat may 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
Lamna nasus	Porbeagle shark, Mackerel Shark	N/A	Migratory	N/A	Species or species habitat may occur within area
Centrophorus zeehaani	Southern dogfish	Conservation Dependent	N/A	N/A	Species or species habitat likely to occur within area
Glyphis garricki	Northern River Shark, New Guinea River Shark	Endangered	N/A	N/A	Species or species habitat may occur within area

Table 4-7: Shark BIAs within the EMBA

Species	BIA type	Approximate distance (km) and direction from PAA
Rhincodon typus (Whale Shark)	Foraging (Northward from Ningaloo along 200 m isobath)	Overlaps PAA
	Foraging (high prey density) (Ningaloo Marine park and adjacent Commonwealth waters)	211 km south

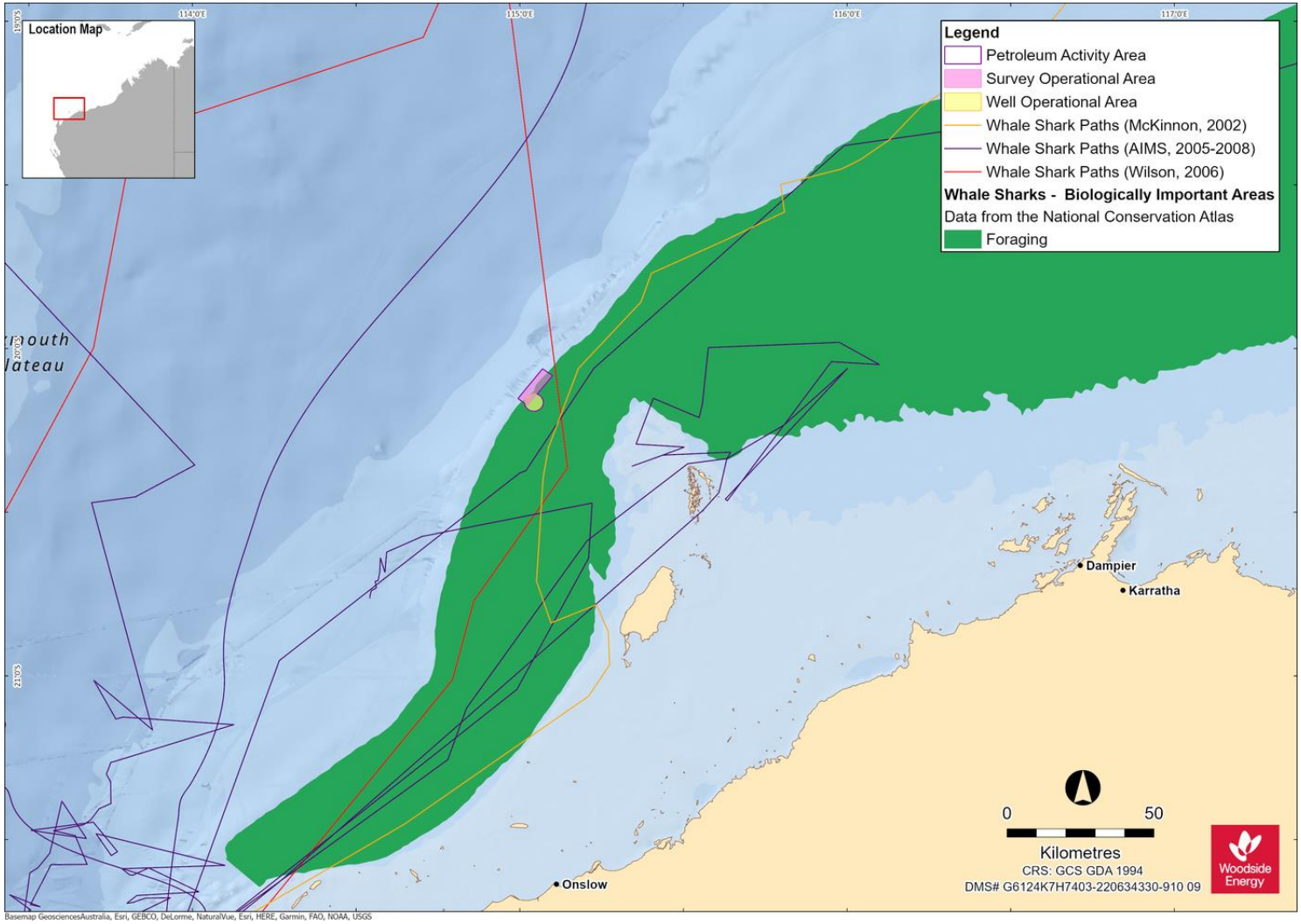


Figure 4-4: Whale shark BIA within the EMBA

4.6.2 Marine Reptiles

Table 4-8: Table Threatened and Migratory marine reptile species predicted to occur within the PAA and EMBA

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

Table 4-9: Marine Turtle BIAs overlapping the PAA and EMBA

Species	BIA type	Approximate distance (km) and direction from PAA
Natator depressus (Flatback turtle)	Internesting buffer (Montebello Is – Hermite Is, NW Is, Trimouille Is)	Overlaps PAA
	Internesting buffer (Thenervard Island – South coast)	44 km east
	Foraging (Coral reef habitat west of the Montebello group. Extends the entire length of Montebellos, Montebello Is – Hermite Is, NW Is, Trimouille Is)	52 km east
	Internesting buffer (Coral reef habitat west of the Montebello group. Extends the entire length of Montebellos)	52 km east
	Mating (Coral reef habitat west of the Montebello group. Extends the entire length of Montebellos, Montebello Is – Hermite Is, NW Is, Trimouille Is)	52 km east
	Aggregation (Coral reef habitat west of the Montebello group. Extends the entire length of Montebellos)	52 km east
	Nesting (Montebello Is – Hermite Is, NW Is, Trimouille Is)	53 km east
	Nesting (Barrow Island)	65 km east
	Foraging (Barrow Island)	65 km east
	Mating (Barrow Island)	65 km east
	Internesting buffer (Dampier Archipelago (islands to the west of the Burrup Peninsula, Intercourse Is, Legendre Is, Huay Is)	82 km east
	Nesting (Thevernard Island – south coast)	123 km east
	Internesting buffer (Delambre Is)	140 km east
Chelonia mydas (Green turtle)	Internesting (Montebello Islands, Coral reef habitat west of the Montebello group. Extends the entire length of Montebellos and Barrow Island)	45 km east
	Internesting buffer (Montebello Islands; Montebello Islands – Hermite Is, NW Is, Trimouille Is, Middle Is, West coast Barrow Island, West Coast and North Coast)	28 km east

Species	BIA type	Approximate distance (km) and direction from PAA
	Foraging (Montebello Islands, coral reef habitat west of the Montebello group. Extends the entire length of the Montebellos, Montebello Is – Hermite Is, NW Is, Trimouille Is)	48 km east
	Mating (Montebello Islands, coral reef habitat west of the Montebello group. Extends the entire length of the Montebellos, Montebello Is – Hermite Is, NW Is, Trimouille Is)	48 km east
	Nesting (Montebello Islands, Hermite Is, NW Is, Trimouille Is, Middle Is. West Coast Barrow Island West Coast and North Coast)	48 km east
	Internesting buffer (Montebello Islands, coral reef habitat west of the Montebello group. Extends the entire length of the Montebellos)	48 km east
	Aggregation (Coral reef habitat west of the Montebello group. Extends the entire length of the Montebellos)	52 km east
	Mating (Middle Is. West Coast Barrow Island West Coast and North Coast)	65 km east
	Basking Middle Is. (West Coast Barrow Island West Coast and North Coast)	65 km east
	Foraging (inshore tidal and shallow subtidal areas around Barrow Island)	65 km east
	Internesting buffer (Barrow Island)	65 km east
	Internesting buffer (North and South Murion Is)	152 km south
	Nesting (North and South Murion Is)	174 km south
	Internesting buffer (North West Cape)	178 km south
	Nesting (North West Cape)	200 km south
Eretmochelys imbricata (Hawksbill turtle)	Internesting buffer (Montebello Is, Trimoulle and NW islands, Ah Chong Is, South East Is, Barrow Island, Varanus Island, Lowendal Island group)	35 km east
	Foraging (Montebello Is – Hermite Is, NW Is, Trimouille Is, shallow water coral reef and artificial reef (pipeline) habitat, Lowendal Island Group)	54 km east
	Mating (Montebello Is – Hermite Is, NW Is, Trimouille Is, Barrow Island, Lowendal Island Group)	54 km east
	Nesting (Montebello Is – Hermite Is, NW Is, Trimouille Is, Barrow Island, Lowendal Island Group)	54 km east

Species	BIA type	Approximate distance (km) and direction from PAA
	Internesting buffer (Thevenard Island)	115 km south
	Nesting (Thevenard Island)	137 km south
	Internesting buffer (Ningaloo coast and Jurabi Island)	180 km south
	Nesting (Ningaloo coast and Jurabi Island)	200 km south
Caretta caretta (Loggerhead Turtle)	Internesting buffer (Montebello Islands)	38 km east
	Internesting buffer (Lowenthal Island)	52 km east
	Nesting (Montebello Islands)	58 km east
	Internesting buffer (Murion Island)	152 km south
	Nesting (Murion Island)	172 km south
	Internesting buffer (Ningaloo coast and Jurabi coast)	180 km south
	Nesting buffer (Ningaloo coast and Jurabi coast)	200 km south
	Internesting coast (Gnarloo Bay)	405 km south

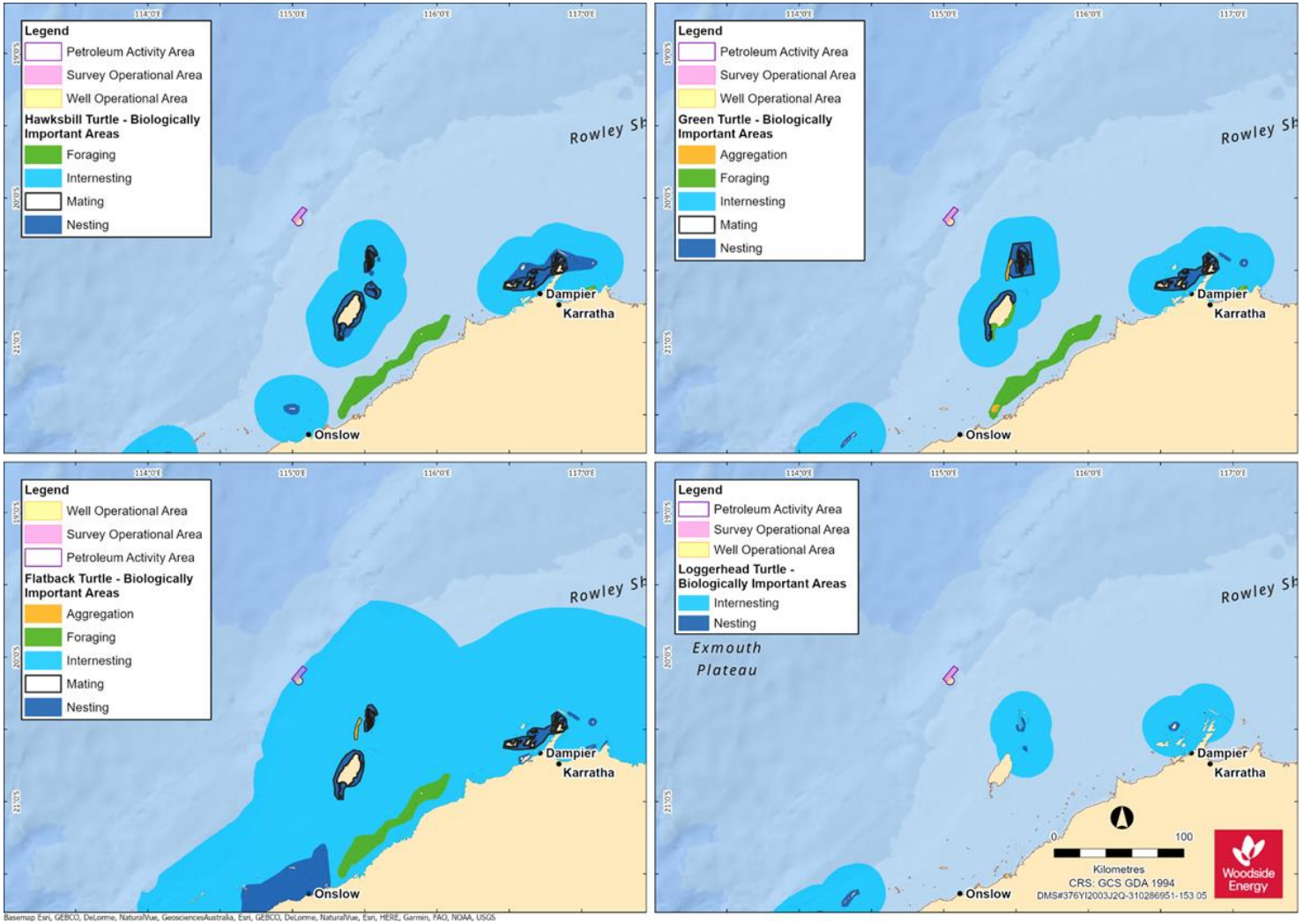


Figure 4-5: Marine turtle BIAs within the EMBA

Table 4-10: Internesting Habitat Critical to the Survival of Marine Turtle Species predicted to occur within the PAA and EMBA

Species	Genetic Stock	Nesting Locations	Approximate Distance of Area from PAA	Internesting Buffer	Nesting Period	Hatching Period
Flatback turtle	Pilbara	Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island, Dampier Archipelago, including Delambre Island and Hauy Island	Overlaps	40 km	Oct-March (peak: Feb-Mar)	Oct-Mar
Green turtle	North West Shelf	Barrow Island, Montebello Islands, Serrier Island and Thevenard Island, Dampier Archipelago, Exmouth Gulf and Ningaloo coast, Scott Reef	30 km east	20 km	Nov-Mar	Jan-May (peak: Feb-Mar)
Hawksbill turtle	Western Australia	Cape Preston to mouth of Exmouth Gulf including Montebello Islands and Lowendal Islands, Dampier Archipelago, including Delambre Island and Rosemary Island,	30 km east	20 km	All year (peak: Oct-Feb)	All year (peak: Feb-Mar)
Loggerhead turtle	Western Australia	Exmouth Gulf and Ningaloo coast, Gnaraloo Bay and beaches, Shark Bay, all coastal and island beaches out to the northern tip of Dirk Hartog Island.	177 km south-west	20km	Nov-May (Peak Jan)	Jan-May
Leatherback turtle	No overlap – nesting located in Northern Territory and North Queensland					
Olive ridley turtle	No overlap – nesting located in Northern Territory and North Queensland					

Marine Turtles

The closest known turtle nesting beaches to the PAA are Barrow Island, the Montebello Islands and the islands of the Dampier Archipelago (**Table 4-9** and **Table 4-10**). Rosemary Island has the most significant nesting beaches, determined as mean number of hawksbill, green and flatback turtle tracks per day (Pendoley et al., 2016) and is recognised as an internationally significant rookery for hawksbill turtles, with one of the largest nesting populations in Australia and globally (Limpus, 2009). Barrow Island hosts the second largest flatback rookery in the Pilbara Region, however significantly larger nesting beaches occur further north in the Kimberley region (Pendoley et al., 2016).

Seasonality of nesting differs between flatback, green and hawksbill turtles; **Table 4-15** provides a summary of the key seasonal sensitivities for protected marine reptile species identified as occurring within the Operational Area. A study by Whiting (2018) provides defined seasonality specific nesting data for Rosemary Island and found that hawksbill turtles have a much earlier peak (October/November) compared to flatback turtles (December/January). Seasonality for green turtles was not well defined from the available data (Whiting, 2018).

Pendoley et al. (2016) did not find evidence of loggerhead nesting activity in the Dampier Archipelago over 20 years of track data. The northernmost key loggerhead nesting areas include the North West Cape and Muiron Islands. Any nesting activity by loggerhead turtles in the Dampier Archipelago will not represent significant rookeries for this species (PENV, 2020a). No major leatherback turtle rookeries are known to occur in Australia, with scattered nesting reported in Queensland (Limpus and MacLachlan, 1979; Limpus et al., 1984) and the Northern Territory (Hamann et al., 2006) only.

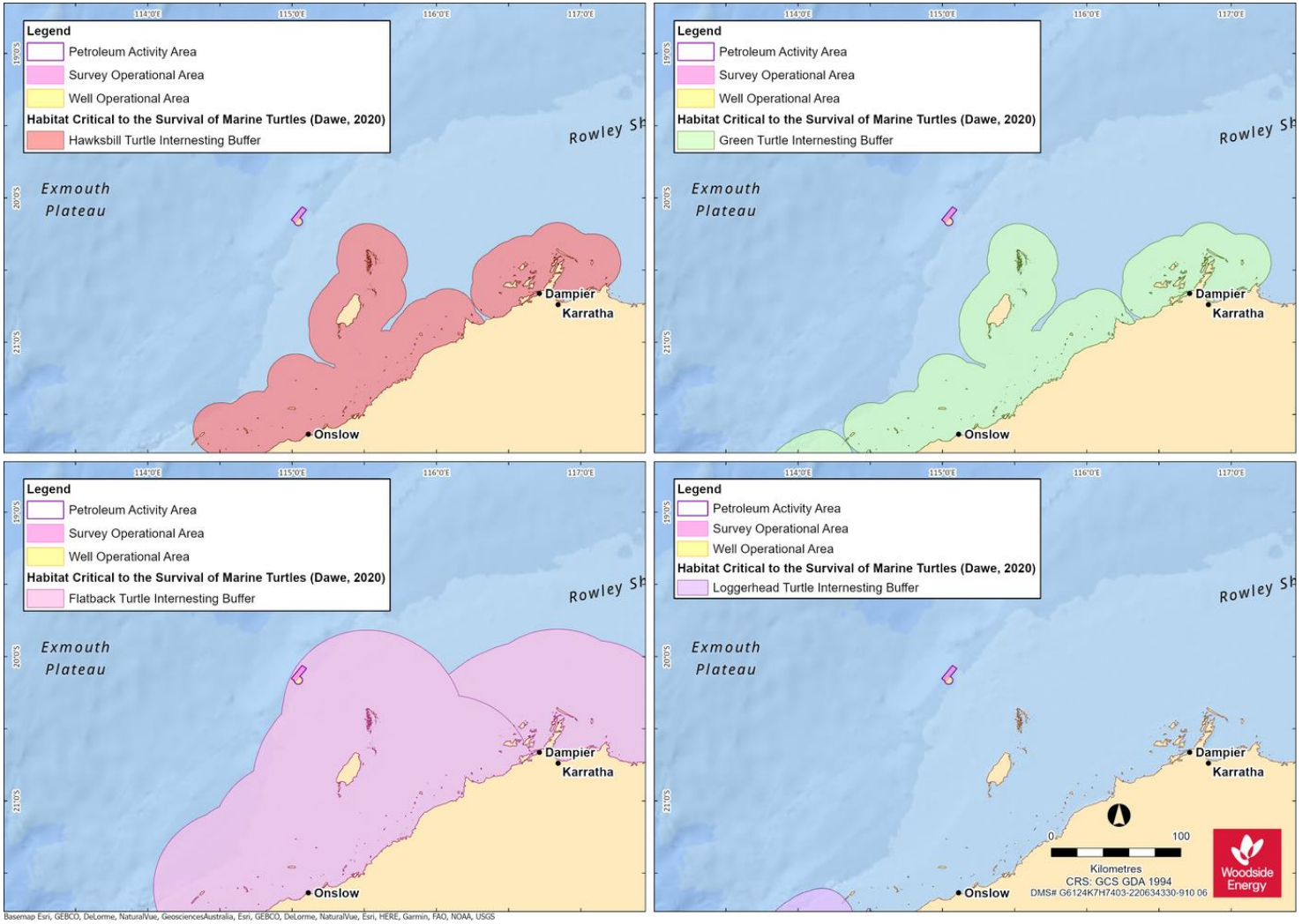


Figure 4-6: Marine turtle Habitat Critical within the EMBA

4.6.3 Marine Mammals

Table 4-11: Threatened and Migratory marine mammal species predicted to occur within the PAA and EMBA

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Balaenoptera musculus	Blue whale (true/Antarctic)	Endangered	Migratory	Migration route known to occur within area	Migration route known to occur within area
*Balaenoptera musculus brevicauda**	Pygmy blue whale	Endangered	Migratory	Migration route known to occur within area	Migration route known 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 physalus	Fin whale	Vulnerable	Migratory	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour likely 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
Physeter macrocephalus	Sperm whale	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Orcinus orca	Killer whale, orca	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Tursiops aduncus	Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Sousa sahulensis as Sousa chinensis	Australian Humpback Dolphin	N/A	Migratory	Species or species habitat may occur in the area	Species or species habitat known to occur within area
Orcaella heinsohni	Australian Snubfin Dolphin	N/A	Migratory	Species or species habitat may occur in the area	Species or species habitat known to occur within area
Eubalaena australis	Southern Right Whale	Endangered	Migratory	N/A	Species or species habitat likely to occur within area
Balaenoptera bonaerensis	Antarctic Minke Whale, Dark-shoulder 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 not detected in PMST search but reported to occur in the area (McCauley, 2011b).

Note: Dolphins of unconfirmed species (potentially Risso's or spinner dolphins) also present in the area (McCauley, 2011b)

Table 4-12: Marine mammal BIAs within the EMBA

Species	BIA type	Approximate distance (km) and direction from PAA
Balaenoptera musculus brevicauda (Pygmy blue whale)	Distribution	Overlaps PAA
	Migration (north and south) (Augusta to Derby)	Overlaps PAA
	Foraging (Ningaloo)	217 km south
Megaptera novaeangliae (Humpback whale)	Migration (north and south) (Kimberley region to North-west cape)	21 km east
	Resting (Exmouth Gulf)	185 km south
Dugong dugon (Dugong)	Foraging (high density seagrass beds) (Exmouth Gulf)	182 km south
	Breeding (Exmouth Gulf)	182 km south
	Nursing (Exmouth Gulf)	182 km south
	Calving (Exmouth Gulf)	182 km south

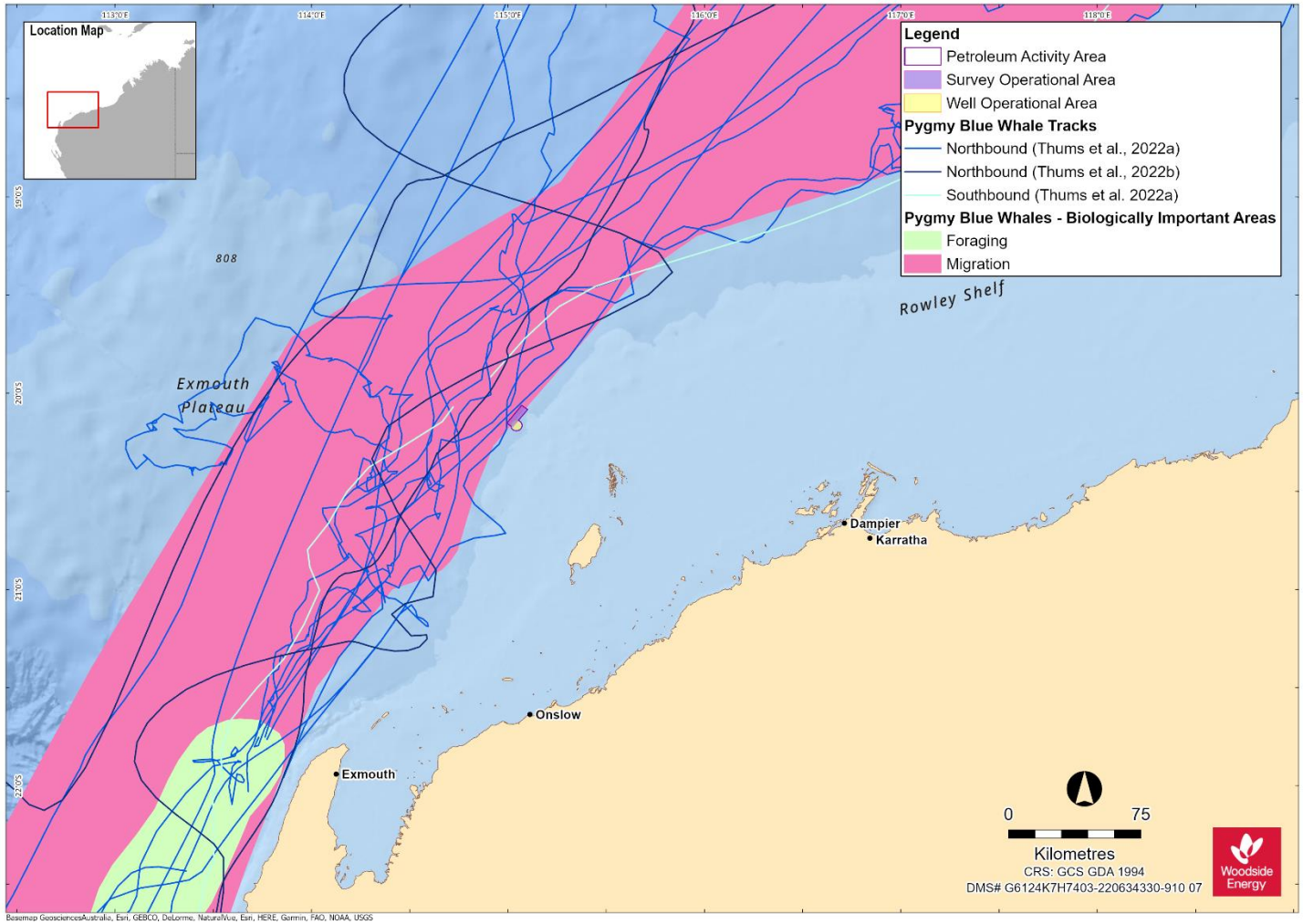


Figure 4-7: Pygmy blue whale BIAs and satellite tracks of northbound migrating pygmy blues whales tagged between 2009 and 2021 (Thums et al., 2022a & Thums et al., 2022b)

Pygmy Blue Whales

The blue whale (*Balaenoptera musculus*) is currently listed as Endangered, Migratory and Cetacean under the EPBC Act and Endangered under the WA Biodiversity Conservation Act 2016 (BC Act, September 2018), refer to the Master Existing Environment.

The important biological habitats for critical life stages of the pygmy blue whale life cycle are presented in the Blue Whale CMP (Commonwealth of Australia, 2015) and the National Conservation Values Atlas (NCVA). The foraging areas correspond to blue whale Biologically Important Areas (BIAs) based on foraging of varying density and likelihood and the NCVA also includes an area of offshore waters in Western Australia that represents the migratory corridor or Migratory BIA for pygmy blue whales, refer to **Figure 4-7**. The distribution range is a spatially defined area representing presence certainty and not biologically important behaviour (e.g. breeding, foraging, migration) as presented in the Blue Whale CMP (Commonwealth of Australia, 2015a). The distribution range acknowledges the migratory movement of pygmy blue whales to the west and east of the Migratory BIA, however the majority of the important migration areas for north-west Australia are within the migratory BIA (Thums et al. 2022a).

Considering the Survey Operational Area overlaps the pygmy blue whale migration BIA and the Well Operational Area is in close proximity to the BIA, it is likely that the migrating individuals may journey past the Operational Area during the north and south bound migratory seasons (April to July and October to January, respectively) (migratory seasons defined as per McCauley, 2011, Double et al. 2014; Gavrilov et al. 2018 and Thums et al, 2022a). Migrating northbound pygmy blue whales display predominantly relatively fast, directed travel interspersed with relatively short periods of low move persistence indicative of foraging (Thums et al. 2022a). The migratory BIA encompassed the majority of important migration areas for northbound pygmy blue whales, however Thums et al. (2022a) did report that most tagged pygmy blue whales migrate much further offshore along the north-west, out to the abyssal plain. The distribution, movement and behaviour of migrating southbound pygmy blue whales is less well understood but based on acoustic detection as reported by McCauley (2011) migrating whales are detected over a short period of time off the continental slope, implying individual whales travel rapidly through the area. Furthermore, Gavrilov et al. (2018) reported southbound migrating pygmy blue whale distribution extended up to 400 km off the mainland inferring a much wider southbound migratory corridor than defined by the migratory BIA. Thums et al. (2022a), also reported shorter residency times on the southern migration but only based on data from two pygmy blue whales and only low density detection of singing whales from October to December implying use of different migration routes to travel south, vocalization not as active southbound or some combination.

The Operational Area is unlikely to support important foraging areas for migrating pygmy blue whales, such as areas where upwelling occurs and prey (krill) availability is recorded. Based on an overlap of three different metrics (occupancy, number of whales in a cell and move persistence) Thums et al. (2022a) identified the most important foraging areas for pygmy blue whales in offshore waters for north-west Australia. The modelling results indicated there were open ocean areas off the shelf edge extending from Ningaloo Reef to the Rowley Shoals utilized by pygmy blue whales in opportunistic foraging bouts.

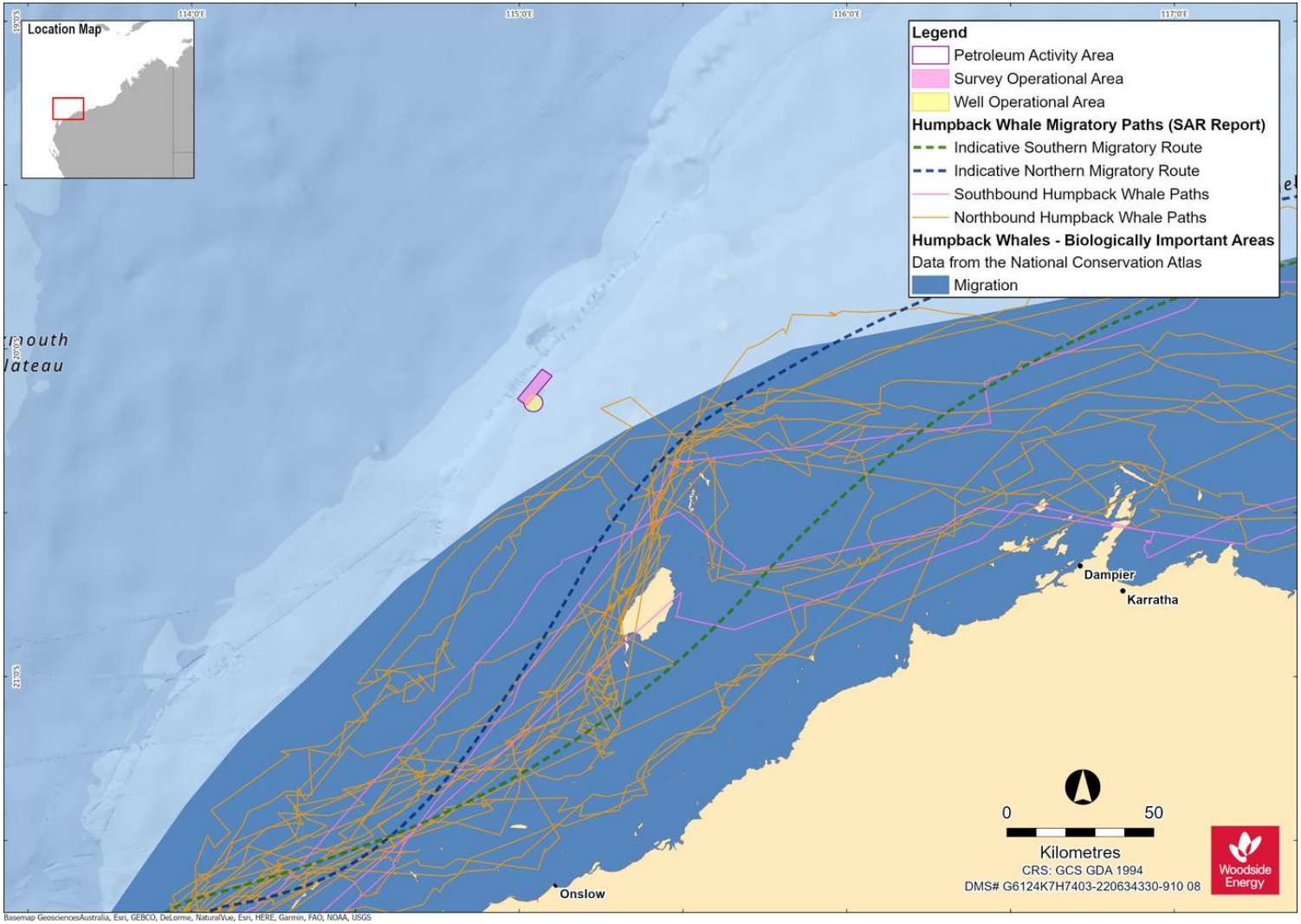


Figure 4-8: Humpback whale BIA within the EMBA

4.6.4 Seabirds and Migratory Shorebirds

Table 4-13: Threatened and Migratory seabird and shorebird species predicted to occur within the PAA and EMBA

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Calidris canutus	Red knot, knot	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	Foraging, feeding or related behaviour likely to occur within area	Breeding known to 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
Anous stolidus	Common noddy	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat likely 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 ferruginea	Curlew sandpiper	Critically Endangered	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 known to occur within area
Fregata ariel	Lesser frigatebird, least frigatebird	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat known to occur within area

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Macronectes giganteus	Southern giant-petrel, southern giant petrel	Endangered	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Numenius madagascariensis	Eastern curlew	Critically Endangered	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Phaethon lepturus	White-tailed tropicbird	N/A	Migratory	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 the area	Species or species habitat may occur within area
Calonectris leucomelas	Streaked shearwater	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Fregata minor	Great frigatebird, greater frigatebird	N/A	Migratory	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 known to occur within area
Ardenna pacifica	Wedge-tailed shearwater	N/A	Migratory	N/A	Breeding known to occur within area
Ardenna carneipes	Flesh-footed shearwater	N/A	Migratory	N/A	Foraging, feeding or related behaviour likely to occur within area

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Charadrius leschenaultii	Greater sand plover	Vulnerable	Migratory	N/A	Species or species habitat known to occur within area
Anous tenuirostris melanops	Australian lesser noddy	Vulnerable	N/A	**N/A**	Foraging, feeding or related behaviour known to occur within area
Papasula abbotti	Abbott's Booby	Endangered	N/A	N/A	Species or species habitat may occur within area
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit	Critically Endangered	Migratory	N/A	Species or species habitat known to occur within area
Macronectes halli	Northern Giant Petrel	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 likely to occur within area
Thalassarche steadi	White-capped Albatross	Vulnerable	Migratory	N/A	Species or species habitat may occur within area
Apus pacificus	Fork-tailed Swift	N/A	Migratory	N/A	Species or species habitat likely 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

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	***EMBA***
Sterna dougallii	Roseate Tern	N/A	Migratory	N/A	Breeding known to occur within area
Sternula albifrons	Little Tern	N/A	Migratory	N/A	Species or species habitat may occur within area
Thalasseus bergii	Greater Crested Tern	N/A	Migratory	N/A	Breeding known to occur within area
Charadrius veredus	Oriental Plover, Oriental Dotterel	N/A	Migratory	N/A	Species or species habitat may occur within area
Glareola maldivarum	Oriental Pratincole	N/A	Migratory	N/A	Species or species habitat may occur within area
Limnodromus semipalmatus	Asian Dowitcher	N/A	Migratory	N/A	Species or species habitat known to occur within area
Limosa lapponica	Bar-tailed Godwit	N/A	Migratory	N/A	Species or species habitat known to occur within area
Pandion haliaetus	Osprey	N/A	Migratory	N/A	Breeding known to occur within area
Tringa nebularia	Common Greenshank, Greenshank	N/A	Migratory	N/A	Species or species habitat likely to occur within area

Table 4-14: Seabird BIAs within the EMBA

Species	BIA type	Approximate distance (km) and direction from PAA
Ardenna pacifica (Wedge-tailed shearwater)	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef	Overlaps PAA
	Foraging (in high numbers) (Off west coast from Ashmore Reef (12º15'S) to Carnac I. (32º07'S), and ranging in western seas between 12º00'S and 33º20'S)	667 km south
Onychoprion anaethetus (Bridled Tern)	Foraging (in high numbers) (West coast of Western Australia and around to Recherche Archipelago including offshore waters)	667 km south
Onychoprion fuscata (Sooty Tern)	Foraging (Timor Sea S to 14º30, off NW coast from Lacepede I SW to 117ºE inc Abrolhos, Fisherman & Lancelin Is, accidental on lower west coast to Hamelin Bay. Breeding visitor (late Aug - early May) Abrolhos & Lancelin Is; casual winter (Nov - Apr) to Fisherman)	692 km south
Pelagodroma marina (White-faced Storm petrel)	Foraging (in high numbers) (Offshore areas of the south-west marine region and into the adjacent south-east marine region and the north-west marine region to north of Shark Bay)	803 km south
Puffinus assimilis tunneyi (Little Shearwater)	Foraging (in high numbers) (From Kalbarri to Eucla including offshore waters)	798 km south
Sterna dougallii (Roseate Tern)	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef,	47 km east
Sternula nereis (Fairy Tern)	Breeding (Pilbara and Gascoyne coasts and islands	43 km east
Thalasseus bengalensis (Lesser Crested Tern)	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	43 km east
Phaethon lepturus (White-tailed Tropicbird)	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	395 km east

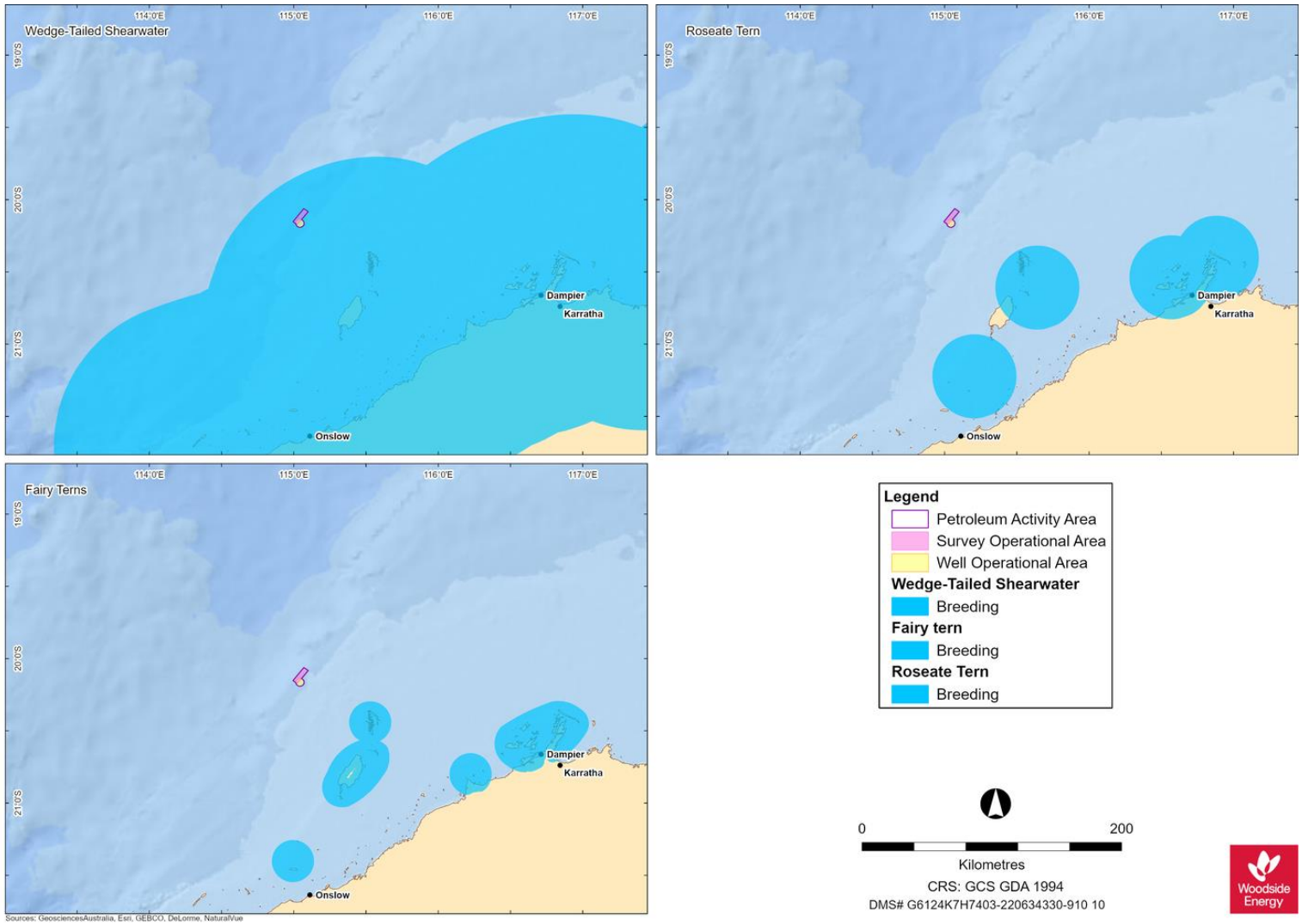


Figure 4-9: Seabird BIAs within the EMBA

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 4-15**. Movement patterns of protected species are further described in **Appendix I**.

As shown in **Figure 4-5**, the PAA overlaps the migratory corridor and 217 km from the possible foraging area off North-west Cape / Ningaloo Coast.

In September 2021, the Department of Agriculture, Water and the Environment (DAWE) and NOPSEMA released guidance on key terms within the Conservation Management Plan for the Blue Whale (the CMP)[3]. This guidance recognises the potential for whale foraging and feeding to occur in areas of high primary productivity outside of designated foraging areas. Migrating pygmy blue whales are not necessarily confined to the designated migratory corridor, and there is the potential for individuals to undertake opportunistic foraging within and adjacent to the PAA, particularly during the northbound migration.

Table 4-15: Key seasonal sensitivities for protected migratory species identified as occurring within the PAA.

Species	January	February	March	April	May	June	July	August	September	October	November	December
Fish, sharks and rays												
Manta rays – presence/aggregation/breeding (Ningaloo)[1]												
Whale shark* - foraging/aggregation (near Ningaloo)[2]												
Marine reptiles												
Green turtle – various nesting/feeding/hatchlings/ mating areas within wider region[3]												
Flatback turtle – various nesting/feeding/hatchlings/ mating areas within wider region[3]												
Hawksbill turtle – various nesting/feeding/hatchlings/ mating areas within wider region[3]												
Loggerhead turtle – various nesting/feeding/hatchlings/ mating areas within wider region[3]												
Marine mammals												

[3] https://www.environment.gov.au/epbc/publications/guidance-key-terms-blue-whale-conservation-management-plan

Species	January	February	March	April	May	June	July	August	September	October	November	December
Pygmy blue whale – northern migration (Exmouth, Montebello, Scott Reef)[4]												
Pygmy blue whale – southern migration (Exmouth, Montebello, Scott Reef)[5]												
Humpback whale – northern migration (Jurien Bay to Montebello)[6]												
Humpback whale – southern migration (Jurien Bay to Montebello)[7]												
Seabirds and shorebirds												
Wedge-tailed shearwater – various breeding sites[8]												
Roseate tern – various breeding sites[8]												
Australian fairy tern[8]												

	Species may be present in the PAA
	Peak period. Presence of animals is reliable and predictable each year

[1] (CALM, 2005; DSEWPaC, 2012a; Environment Australia, 2002; Sleeman et al., 2010)
[2] (Chevron Australia Pty Ltd, 2015; CALM, 2005; DSEWPaC, 2012a)
[3] (Chevron Australia Pty Ltd, 2015; DSEWPaC, 2012a)
[4] (DSEWPaC, 2012a, b; McCauley and Jenner, 2010; McCauley, 2011a)
[5] (DSEWPaC, 2012a, b; McCauley and Jenner, 2010)
[6] (CALM, 2005; Environment Australia, 2002; Jenner et al., 2001a; McCauley and Jenner, 2001)
[7] (McCauley and Jenner 2001)
[8] (CALM, 2005; Department of Environmental Protection, 2001; DSEWPaC, 2012b; Environment Australia, 2002)

4.7 Key Ecological Features (KEFs)

The PAA overlaps with one Key Ecological Features (KEFs); The Continental Slope Demersal Fish Communities KEF. KEFs within the PAA and EMBA are identified in **Table 4-16** and described in **Appendix I**. **Figure 4-10** shows the spatial overlap with KEFs and the PAA.

Table 4-16: KEFs within the PAA and EMBA

Key Ecological Feature	Approximate Distance (km) and direction from PAA to KEF
Continental Slope Demersal Fish Communities	Overlaps PAA
Ancient Coastline at 125 m depth contour	0.6 km east
Exmouth Plateau	87 km north west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	142 km south south west
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	890 km south south west

Key Ecological Feature	Approximate Distance (km) and direction from PAA to KEF
Commonwealth waters adjacent to Ningaloo Reef	183 km south south west
Perth Canyon and adjacent shelf break, and other west coast canyons	880 km south west
Western demersal slope and associated fish communities	654 km south west
Western rock lobster	847 km south south west
Glomar Shoals	162 km east north east

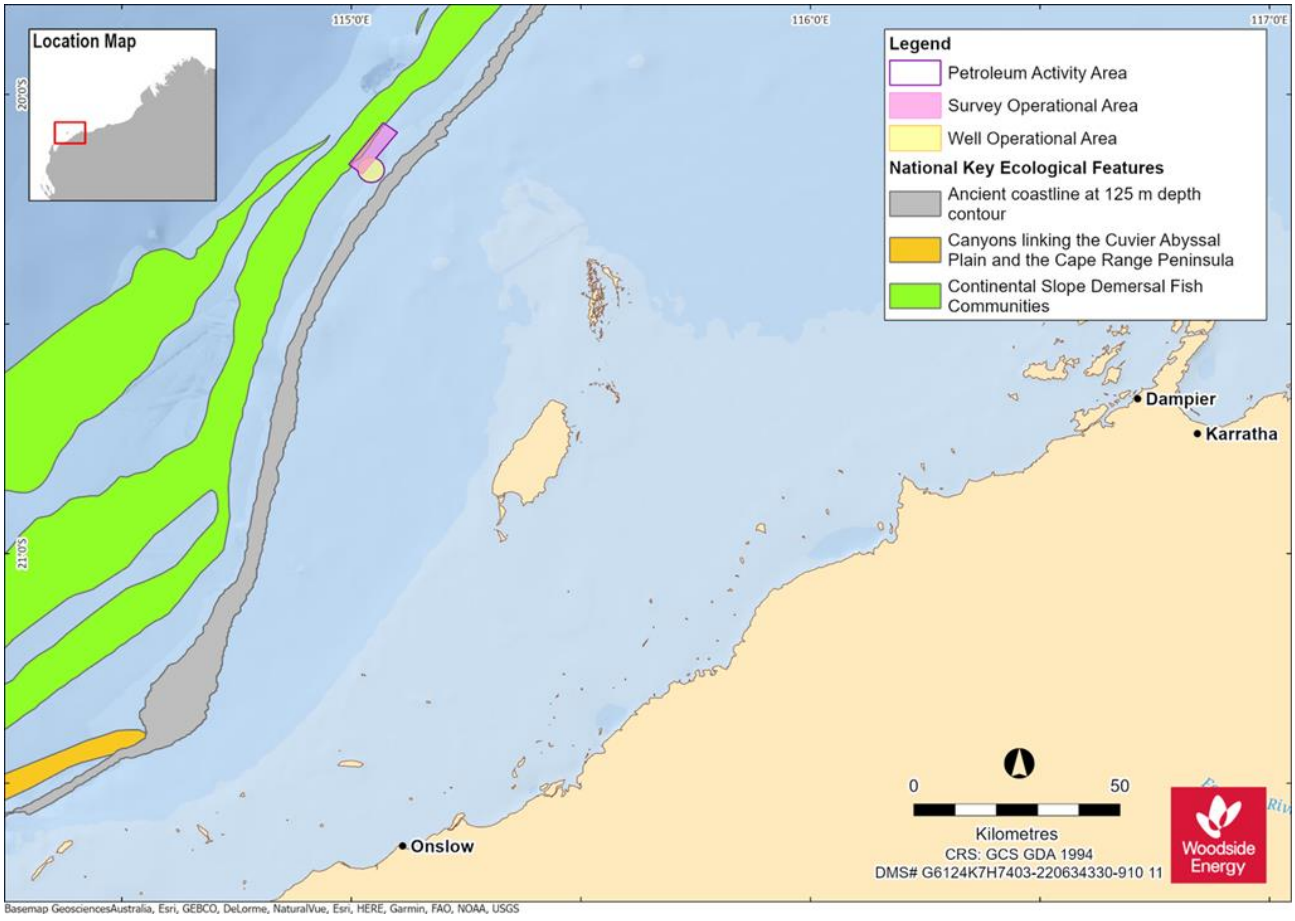


Figure 4-10: KEFs overlapping the PAA

4.8 Protected Places

No protected places overlap the PAA. The closest Australian Marine Park (AMP) is the Montebello Multiple Use Zone (IUCN VI) located 15 km east of the PAA. Protected places within the EMBA are identified in **Table 4-17** and presented in **Figure 4-11**. **Appendix I** outlines the values and sensitivities of protected places and other sensitive areas in the EMBA.

Table 4-17: Table Established protected places and other sensitive areas overlapping the EMBA

	Distance (km) and direction from PAA to protected place or sensitive area	IUCN category* or relevant park zone overlapping the PAA and/or EMBA
Australian Marine Parks (AMPs)		
Abrolhos	742 km south west	Multiple Use Zone (IUCN VI)
	819 km south south west	Special Purpose Zone (IUCN VI)
Carnarvon Canyon	532 km south west	Habitat Protection Zone (IUCN IV)
Gascoyne	303 km south south west	Habitat Protection Zone (IUCN IV)
	373 km west south west	National Park Zone (IUCN II)
	151 km south west	Multiple Use Zone (IUCN VI)
Montebello	15 km east	Multiple Use Zone (IUCN VI)
Shark Bay	505 km south south west	Multiple Use Zone (IUCN VI)
Ningaloo	320 km south west	National Park Zone (IUCN II)
	187 km south west	Recreational Use Zone (IUCN IV)
Agro-Rowley Terrace	297 km north east	Multiple Use Zone (IUCN VI)
State Marine Parks and Nature Reserves		
Marine Parks		
Montebello Islands	42 km south east	N/A
Barrow Island	64 km south east	N/A
Ningaloo	185 km south west	N/A
Conservation Park		
Montebello Islands	50 km south east	N/A
National Park		
Cape Range	223 km south west	II
5(1)(h) Reserve		
Unnamed WA40828	57 km south east	N/A
Nyingguulu (Ningaloo) Coastal Reserves	310 km south	N/A
Unnamed WA41080 S5H	50 km south east	N/A
Unnamed WA44665	150 km south south west	N/A
Jurabi Coastal Park	201 km south west	N/A
Unnamed WA40322	125 km south	N/A
Marine Management Areas		
Barrow Island	46 km south east	N/A
Muiron Islands	167 km south west	N/A
Nature Reserves		
Barrow Island	62 km south east	Ia
Boodie, Double Middle Islands	74 km south east	Ia

	Distance (km) and direction from PAA to protected place or sensitive area	IUCN category* or relevant park zone overlapping the PAA and/or EMBA
Lowendal Islands	66 km south east	Ia
Serrurier Island	158 km south west	Ia
Round Island	161 km south west	Ia
Bessieres Island	145 km south west	Ia
Airlie Island	125 km south	Ia
Muiron Islands	171 km south west	Ia
Thevenard Island	137 km south	Ia
Great Sandy Island	120 km south east	Ia

**Conservation objectives for IUCN categories include:*
Ia: Strict Nature Reserve
Ib: Wilderness Area
II: National Park
III: Natural Monument or Feature
IV: Habitat/Species Management Area
V: Protected Landscape
VI: Protected area with sustainable use of natural resources – allow human use but prohibits large scale development.
IUCN categories for the marine park are provided and, in brackets, the IUCN categories for specific zones within each Marine Park as assigned under the North-west Marine Parks Network Management Plan 2018 and South-west Marine Parks Network Management Plan 2018.

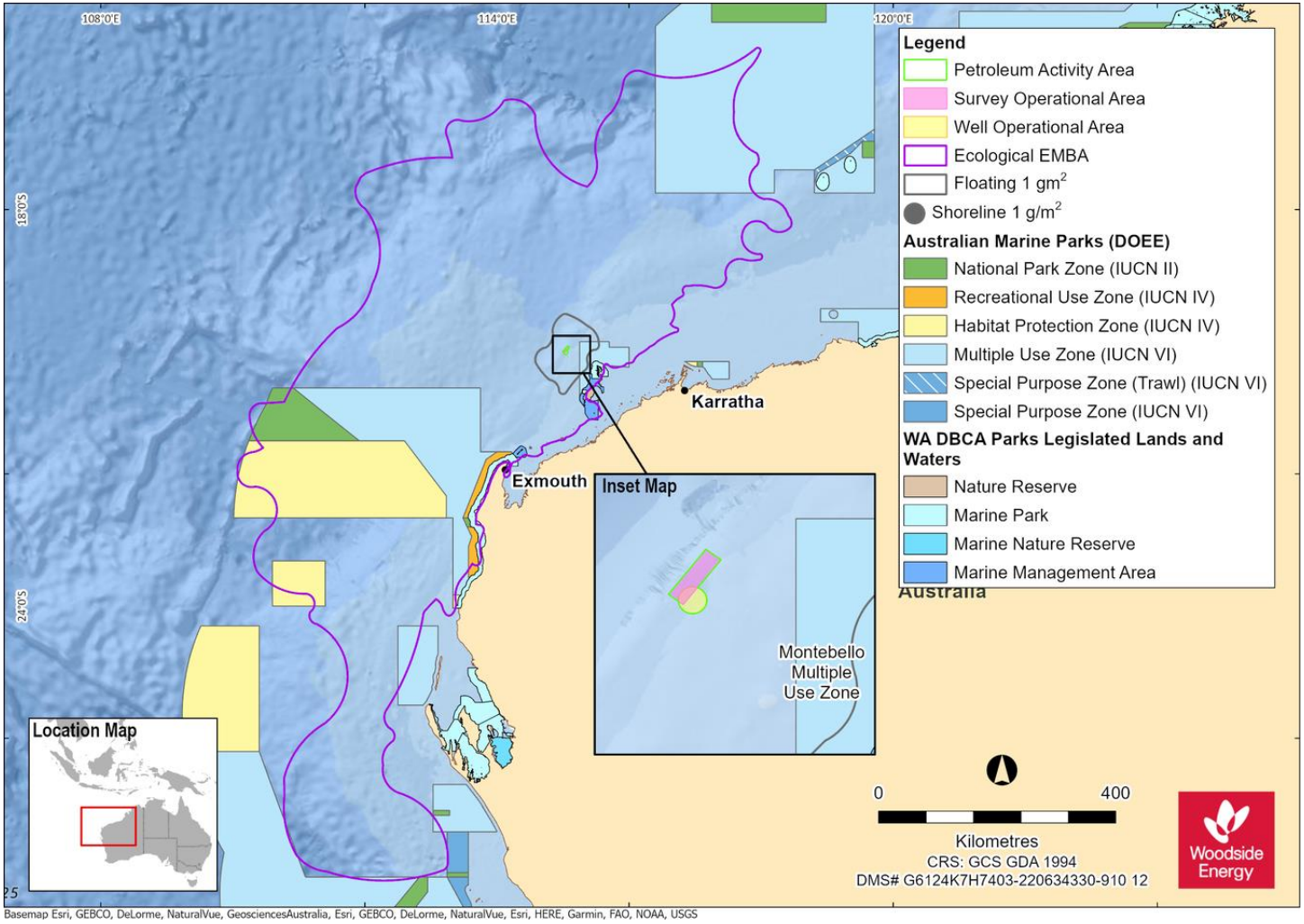


Figure 4-11: Protected areas overlapping the EMBA

4.9 Socio-economic Environment

4.9.1 Cultural Heritage

4.9.1.1 Tangible and Intangible Cultural Values

Woodside understands that communal cultural connection may exist between Traditional Custodians and land and waters. It is understood 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. This extensive occupation of the continent is evidenced by the onshore Archaeological record (Clarkson et al 2017); and archaeological material submerged on the Ancient Landscape (see **Figure 4-12**) has the potential to provide further information about the earliest periods of human occupation (Veth et al 2019; UWA 2021). This information may add to the understanding of Australian prehistory generally. Historic, underwater and other statutorily protected heritage, including National and World Heritage, is also generally understood to be of cultural value to Australia and the global community. In addition, it is understood from the Commonwealth and State Marine Park Management Plans there could be Traditional Custodian groups or native title representative groups who may have responsibility for sea country within marine park areas.

Woodside understands the distance of the PAA from areas occupied and/or utilised by, or subject to the visual consideration of, Aboriginal people is a relevant consideration to the identification of cultural values.

Woodside's identification and management of cultural values is informed by relevant standards and frameworks, including the International Council on Monuments and Sites (ICOMOS) 2013 Burra Charter, the International Finance Corporation Social and Environmental Performance Standards, 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.

Woodside acknowledges that the Burra Charter provides the best practice guidance and standards regarding the identification, assessment and conservation of cultural heritage in Australia. In particular, it stresses the importance of a values-based approach to heritage which seeks to conserve the significance and context of heritage places as well as their material "fabric". The Burra Charter forms part of the Woodside cultural heritage management procedures for all Woodside cultural heritage management plans, cultural surveys, assessments and protection.

Woodside considers the Australian Government Department of the Environment and Water Resources (now the Department of Climate Change, Energy, the Environment and Water (DCCEEW)) Sea Countries of the North-West; Literature review on Indigenous connection to and uses of the North West Marine Environment (2007) in it's engagement with Traditional Custodians. The objective of this literature review is to provide guidance about marine environment conservation priorities, inform the relevant Commonwealth Minister when making decisions in respect of development or resource use applications in Commonwealth waters and facilitate the identification and establishment of Marine Protected Areas (MPAs) in the North West Marine Region.

The North-West Marine Park Network encompasses thirteen Australian Marine Parks (AMPs) in the northwest of Australia, extending from the Western Australian-Northern Territory border in the North, to Kalbarri, south of Shark Bay to the south. The South-West Marine Park Network encompasses fourteen Australian Marine Parks (AMPs) in the southwest of Australia, extending from Kalbarri in the north through South-west Corner to Kangaroo Island in the East. The network of marine parks are managed under the North-West Regional Marine Plan 2018 and South-West Marine Parks

Network Management Plan 2018 (Marine Plans), with the primary objective to provide for the protection and conservation of biodiversity and other natural, cultural and heritage values of the marine parks in the region. Woodside acknowledges the EMBA for this EP overlaps with features of the Marine Plans, which identifies natural, cultural and spiritual values associated with AMPs, specifically the Abrolhos AMP, Argo-Rowley Terrace AMP, Carnarvon Canyon AMP, Gascoyne AMP, Ningaloo AMP (and World Heritage property), Montebello AMP, and Shark Bay AMP (and World Heritage property). Woodside considers this literature in its engagement with Traditional Custodians where the EMBA for its proposed activities overlap the Marine Plans.

4.9.1.2 Native Title, ILUA and Marine Park Management Plans

Native title claims are applications made to the Federal Court under the Native Title Act 1993 (Cth) for a determination, or decision about native title in a particular area. A claimant application is made by a native title claim group (or "society" – see below) 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 claimant application, the native title claim group seeks a decision that native title exists, so its physical and spiritual rights and interests are recognised by the common law of Australia. This is called a native title determination. A determination is a decision by a recognised body, such as the Federal Court or High Court of Australia, that native title either does or does not exist in relation to a particular area (Native Title Tribunal).

A requirement to establishing a positive determination of native title in court is proving that there is an organised society (group) that occupies the claimed land and 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…

It is, therefore, the society (or group) of native titleholders that hold communal native title and native title claims are understood to represent the area over which Indigenous groups are claiming their rights and interests. Comparatively, a native title determination is where native title has been determined to exist, which may include only part of a native title claim, and are understood to represent the lands and waters over which the native title group has recognised rights and interests. Where a Court has determined that native title exists, those native title rights and interests will be held in trust by the Registered Native Title Body Corporate (section 57, Native Title Act 1993).

Indigenous people have also sought legal recognition of their rights and interests through negotiation of Indigenous Land Use Agreements (ILUAs). An ILUA is a voluntary agreement between native title parties and other people or bodies about the use and management of areas of land and/or waters. 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 bind the relevant native title holders to the terms of the agreement. ILUAs also operate as a contract between the parties (Native Title Tribunal).

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. In addition, it is understood from the Commonwealth and State Marine Park Management Plans there could be Traditional Custodian groups or native title representative groups who may have responsibility for sea country within marine park areas. Woodside assesses Marine Park

Management Plans that overlap the EMBA to determine whether cultural values have been identified or whether there are Traditional Custodians or representative bodies referenced to contact regarding potential cultural values.

To understand the existing marine environment for Indigenous groups, Woodside uses the native title claim area and/or ILUA as it considers this to be greatest extent of the area over which a Traditional Custodian has claimed rights and interests under Australian law. Woodside acknowledges that, extending responsibility for those claims, determinations or ILUAs to areas which Indigenous groups have elected to not include in their claims or ILUAs can have significant cultural consequences for Traditional Custodians as well as over time, building an expectation in the broader Indigenous community that a group is responsible for maintaining sea country over which they do not hold traditional knowledge. Woodside also acknowledges that an Indigenous group's relative proximity to any Operational Areas 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. Woodside understand that Indigenous groups are keenly aware of the extent of their rights, interests and responsibilities for Country, and these are generally discrete, defined areas. The Operational Area for the proposed activity is defined in **Section 3.3** and EMBA is illustrated **Figure 4-1**.

For the activity in this EP, there are no native title claims or determinations, ILUAs or Commonwealth or State Marine Park Management Plans overlapping the Operational Area and therefore also no native title rights or interests and/or cultural values identified over the Operational Area (**Figure 4-12**;

Table 4-18).

There is one native title claim overlapping the EMBA (**Figure 4-12**). There is one ILUA overlapping the EMBA. There are seven Commonwealth Marine Park Management Plans overlapping the EMBA and eight State Marine Park Management Plans overlapping the EMBA (**Table 4-19**).

See **Figure 4-12** for an overview of the EP PAA and EMBA n relation to native title claims, determinations and ILUAs.

See

Table 4-18 for a summary of native title claim or determination and ILUA EMBA overlap and coastally adjacent.

See **Table 4-19** for a summary of Commonwealth and State Marine Park Management Plan EMBA overlap.

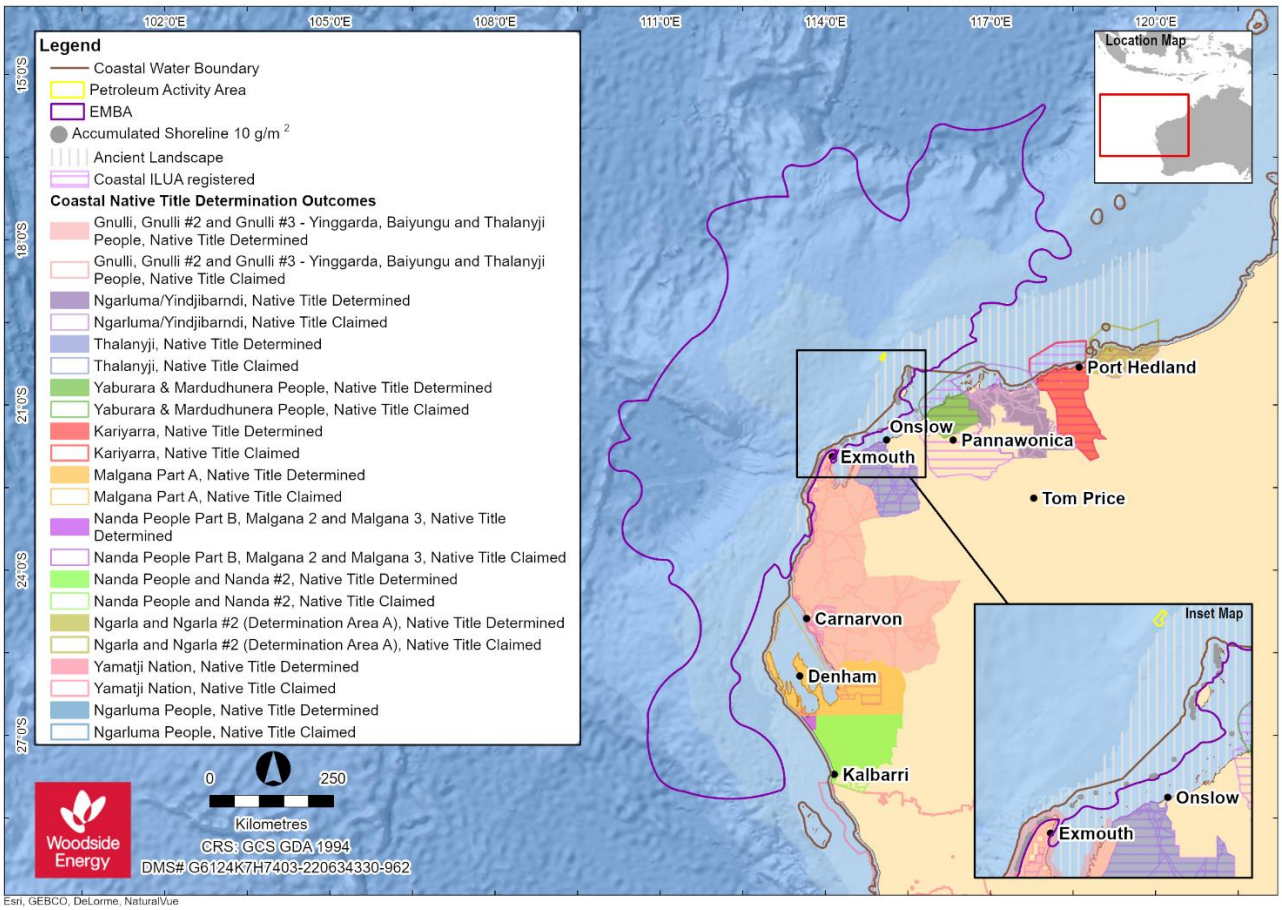


Figure 4-12: **Petroleum Activity Area** and EMBA in relation to native title claims, determinations and ILUAs.

Table 4-18 Summary of Native Title Claim or Determination and ILUA EMBA overlap and coastally adjacent

	EMBA Traditional Custodian Group Overlap	Traditional Custodian Groups Coastally Adjacent to the EMBA
Native Title Claim		
Gnulli, Gnulli #2 and Gnulli #3 – Yinggarda, Baiyungu and Thalanyji People	Yes – Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC), Yinggarda Aboriginal Corporation (YAC)	Yes – NTGAC, YAC
Kariyarra	No	Yes – Kariyarra Aboriginal Corporation
Malgana Part A	No	Yes – Malgana Aboriginal Corporation
Nanda People and Nanda #2	No	Yes – Nanda Aboriginal Corporation
Nanda People Part B, Malgana 2 and Malgana 3	No	Yes – Malgana Aboriginal Corporation, Nanda Aboriginal Corporation
Ngarla and Ngarla #2 (Determination Area A)	No	Yes – Wanparta Aboriginal Corporation
Ngarluma People	No	Yes – Ngarluma Aboriginal Corporation (NAC)
Ngarluma/Yindjibarndi	No	Yes – NAC, Yindjibarndi Aboriginal Corporation
Thalanyji	No	Yes – Buurabalayji Thalanyji Aboriginal Corporation (BTAC)
Yaburara & Mardudhunera People	No	Yes – Wirrawandi Aboriginal Corporation (WAC)
Yamatji Nation	No	Yes – Bundi Yamatji Aboriginal Corporation
ILUA		
Ningaloo Conservation Estate ILUA	Yes – NTGAC	Yes – NTGAC
Alinta-Kariyarra Electricity Infrastructure ILUA	No	Yes – however no Traditional Custodian group specified
Anketell Port, Infrastruture Corridor and Industrial Estates Agreement	No	Yes – NAC
Brickhouse and Yinggarda Aboriginal Corporation ILUA	No	Yes – YAC

	EMBA Traditional Custodian Group Overlap	Traditional Custodian Groups Coastally Adjacent to the EMBA
Native Title Claim		
Cape Preston Project Deed (YM Mardie ILUA)	No	Yes – WAC
Cape Preston West Export Facility	No	Yes – WAC
FMG – Kariyarra Land Access ILUA	No	Yes – however no Traditional Custodian group specified
Gnaraloo Indigenous Land Use Agreement	No	Yes – NTGAC
Kariyarra and State ILUA	No	Yes – Kariyarra Aboriginal Corporation
KM & YM Indigenous Land Use Agreement 2018	No	Yes – WAC, Robe River Kuruma Aboriginal Corporation
Kuruma Marthudunera and Yaburara and Coastal Mardudhunera Indigenous Land Use Agreement	No	Yes – however no Traditional Custodian group specified.
Macedon ILUA	No	Yes – BTAC
Malgana Tamala Pastoral Lease Agreement	No	Yes – Malgana Aboriginal Corporation
Malgana Woodleigh Carbla Pastoral Lease Agreement	No	Yes – Malgana Aboriginal Corporation
Malgana Wooramel Pastoral Lease Agreement	No	Yes – Malgana Aboriginal Corporation
Ngarla Pastoral ILUA	No	Yes – Wanparta Aboriginal Corporation
Ningaloo Conservation Estate ILUA	No	Yes – NTGAC
Quobba – Yinggarda Pastoral ILUA	No	Yes – YAC
RTIO Kuruma Marthudunera People ILUA	No	Yes – Robe River Kuruma Aboriginal Corporation
RTIO Ngarluma ILUA (Body Corporate Agreement)	No	Yes – NAC
Yamatji Nation Agreement	No	Yes – Bundi Yamatji Aboriginal Corporation

Table 4-19: **Summary of Commonwealth and State Marine Park Management Plan EMBA overlap**

Marine Park Management Plan	EMBA Traditional Custodian Group Overlap
Commonwealth Marine Park Management Plan	
Abrolhos AMP	Yes – however no Traditional Custodian group specified.
Carnarvon Canyon AMP	Yes – however no Traditional Custodian group specified.
Gascoyne AMP	Yes – however no Traditional Custodian group specified.
Montebello AMP	Yes – however no Traditional Custodian group specified.
Shark Bay AMP	Yes - however no Traditional Custodian group specified.
Ningaloo AMP	Yes - however no Traditional Custodian group specified.
Argo-Rowley Terrace AMP	Yes - however no Traditional Custodian group specified.
State Marine Park Management Plan	
Montebello Islands MP	Yes - however no Traditional Custodian group specified.
Barrow Island MP	Yes – however no Traditional Custodian group specified.
Ningaloo MP	Yes – NTGAC, YAC
Nyingguulu (Ningaloo) Coastal Reserves Joint Management Plan	Yes - Nganhurra Thanardi Garrbu Aboriginal Corporation
Barrow Island Marine Management Area	Yes – however no Traditional Custodian group specified.
Muiron Islands Marine Management Area	Yes - however no Traditional Custodian group specified.
Cape Range National Park	Yes - however no Traditional Custodian group specified.
Barrow Island Nature Reserve	Yes – however no Traditional Custodian group specified

The Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) is the Registered Native Title Body Corporate holding native title on behalf of the Baiyungu and Thalanyji people for land and waters along the Exmouth coast. 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.

The Buurabalayji Thalanyji Aboriginal Corporation (BTAC) is the Registered Native Title Body Corporate holding native title on behalf of the Thalanyji people to the west of NTGAC, for land and waters along the Onslow coast.

The Yinggarda Aboriginal Corporation (YAC) is the Registered Native Title Body Corporate holding native title on behalf of the Yinggarda people to the south of NTGAC, for land along the Carnarvon coast. The YAC's nominated representative is the YMAC and the YAC executive officer and contact

officer pursuant to the Corporations (Aboriginal and Torres Strait Islander) Act 2006 is employed by YMAC.

The Ngarluma Aboriginal Corporation (NAC) is the Registered Native Title Body Corporate holding native title on behalf of the Ngarluma people for land along the coast around Roebourne and Karratha.

The Wirrawandi Aboriginal Corporation (WAC) is the Registered Native Title Body Corporate holding native title on behalf of the Yaburara and Mardudhunera People for land southeast of NAC.

The Robe River Kuruma Aboriginal Corporation is the Registered Native Title Body Corporate holding native title on behalf of the Mardudhunera and Kuruma people south of WAC.

The Malgana Aboriginal Corporation is the Registered Native Title Body Corporate holding native title on behalf of the Malgana people for land along the Shark Bay coast.

The Yindjibarndi Aboriginal Corporation is the Registered Native Title Body Corporate holding native title on behalf of the Yindjibarndi people for land to the east and inland from NAC.

The Nanda Aboriginal Corporation is the Registered Native Title Body Corporate holding native title on behalf of the Nanda people for land south of Shark Bay.

The Kariyarra Aboriginal Corporation is the Registered Native Title Body Corporate holding native title on behalf of the Kariyarra people for land along the coast around Port Hedland.

The Wanparta Aboriginal Corporation is the Registered Native Title Body Corporate holding native title on behalf of the Wanparta people for land east of Port Hedland.

The Bundi Yamatji Aboriginal Corporation is the Registered Native Title Body Corporate holding native title on behalf of the Yamatji Nation for land along the coast around Geraldton.

4.9.1.3 Ancient Landscape

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). The Ancient Coastline KEF at 125 m depth contour represents the lowest sea level during Indigenous occupation (O'Leary et al 2020; see also Williams et al 2018; UWA 2021). It is also understood that traditional knowledge retains a memory, stories and intangible heritage information about the inundation of the ancient landscape in some places, including at Murujuga (McDonald and Phillips, 2021), and recent archaeological discoveries offer support for claims that the now submerged landscape was occupied and inhabited (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 (**Figure 4-12**) 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 under the Aboriginal and Torres Strait Islander Heritage Protection Act 1984, Underwater Cultural Heritage Act 2018 or EPBC Act 1999.

Where Indigenous archaeological material is identified within a native title claim or determination or an ILUA, Woodside will discuss the management of this material with the relevant Traditional Custodian group(s) as well as seek to identify and manage any cultural or other values that these materials may hold for those groups.

4.9.1.4 Indigenous sites of significance

Woodside understands that there is no Indigenous archaeology known to exist anywhere within Commonwealth waters.

Within the EMBA, Barrow Island, Montebello Islands, Exmouth, Ningaloo Reef and the adjacent foreshores have a long history of occupancy by Aboriginal communities. The longstanding relationship between Aboriginal people and the land and sea is prevalent in Indigenous culture today and Indigenous heritage places onshore or in Western Australian waters, including archaeological sites, are protected under the *Aboriginal Heritage Act 1972* (WA). Sites in Commonwealth waters may be protected under the Underwater Cultural Heritage Act 2018 or Aboriginal and Torres Strait Islander Heritage Protection Act 1984.

For this EP, a DPLH search was undertaken, which indicated a number of Indigenous heritage places in the EMBA (see **Appendix G**). The exact location, access, and traditional practices for 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 Western Australian Department of Aboriginal Affairs (DAA) and relevant local Aboriginal communities.

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

4.9.2 Historic Sites of Significance

There are no known sites of historic heritage significance within the PAA. **Appendix I** describes cultural heritage sites within the EMBA.

4.9.2.1 Underwater Heritage

A search of the Australasian Underwater Cultural Heritage Database, which records all known Maritime Cultural Heritage (shipwrecks, aircraft, relics and other underwater cultural heritage) in Australian waters indicated that there are no underwater heritage sites or shipwrecks within the PAA (DCCEEW, 2022).

There are six shipwrecks within 50 km of the PAA. These six vessels are classified as a historic shipwreck under the Commonwealth Historic Shipwrecks Act 1976 and a Protected Place under the EPBC Act and listed in **Table 4-20**.

Table 4-20: Recorded shipwrecks within 50 km of the PAA

Vessel Name	Year Wrecked	Wreck Location	Latitude	Longitude	Distance from PAA
Curlew	1911	At Onslow, Montebellos Group	20.0ºS	115.17ºE	11 km north east
Marietta	1905	Montebello Islands	20.0ºS	115.17ºE	11 km north east
Vianen	1682	Barrow Island Area	20.0ºS	115.17ºE	11 km north east
Wild Wave (China)	1873	Monte Bello Island	20.0ºS	115.17ºE	11 km north east
Tanami	Unknown	Trial Rocks	20.37ºS	115.37ºE	32 km south east
Trial	1622	Trial Rocks	20.29ºS	115.38ºE	33 km south east

4.9.2.2 World, National and Commonwealth Heritage Listed Places

There are no listed World, National or Commonwealth Heritage Places within the PAA. World, national and commonwealth heritage places within the EMBA are listed in **Table 4-21**. The conservation values and sensitivities of these places are described in the Master Existing Environment (**Appendix I**).

Table 4-21: World, National And Commonwealth Heritage Listed Places within the EMBA

Listed Places	Approximate Distance from PAA (km)
World Heritage Places	
The Ningaloo Coast WHP	167 km south west
National Heritage Places	
HMAS Sydney II and HSK Kormoran Shipwreck Site NHP	776 km south west
The Ningaloo Coast NHP	169 km south west
Commonwealth Heritage Places	
HMAS Sydney II and HSK Kormoran Shipwreck Sites CHP	776 km south east
Ningaloo Marine Area – Commonwealth Waters CHP	185 km south east
Learmouth Air Weapons Range Facility CHP	274 km south

4.9.3 Commercial Fisheries

A number of Commonwealth and State fishery management areas are located within the PAA and EMBA. FishCube data were requested to analyse the potential for interaction of fisheries with the PAA, which was used to determine consultation with State Fisheries who may be impacted by proposed petroleum activities (Department of Primary Industries and Regional Development [DPIRD], 2022). **Table 4-22** provides an assessment of the potential interaction and the Master Existing Environment (**Appendix I**) provides further detail on the fisheries that have been identified through desk-based assessment and consultation (**Section 5**). Four state managed fisheries were identified as having a potential interaction with the Petroleum Activities Program. Fisheries identified as having a potential for interaction are shown in in **Figure 4-13**.

Table 4-22: Commonwealth and State commercial fisheries overlapping the PAA and EMBA

Fishery	Potential for interaction During Activity		
	Operational Area	**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 Fishery management area overlaps the EMBA. Fishery Status Reports indicate most recent activity overlapping the EMBA occurred in the 2021-2022 season (Patterson et al., 2022). There has been no fishing effort reported within the Operational Area in the last 5 years (Patterson et al., 2022). Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.

Fishery	Potential for interaction During Activity		
	Operational Area	**EMBA**	**Description**
Western Tuna and Billfish Fishery	×	✓	The Western Deepwater Trawl Fishery management area overlaps the Operational Area and the EMBA. Fishery Status Reports indicate most recent activity overlapping the EMBA occurred in the 2021-2022 season (Patterson et al., 2022). There has been no fishing effort reported within the Operational Area in the last 5 years (Patterson et al., 2022). Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.
Southern Bluefin Tuna Fishery	×	×	The Southern Bluefin Tuna Fishery management area overlaps the EMBA and Operational Area. 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). 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 Operational Area 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.
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. The fishery is active in the EMBA, with eight 60 NM Catch and Effort System (CAES) blocks reporting up to five vessels across the 2017 – 2022 seasons (DPIRD, 2022). The Operational Area overlaps 60 NM CAES blocks 20140 and 20150. 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 blocks 20140 and 20150 overlaps with the Operational Area. However, Woodside considers it a possibility that interactions with the fishery may occur.
Mackerel Managed Fishery (Area 2 and Area 3)	✓	✓	The Mackerel Managed Fishery management area overlaps the EMBA and Operational Area. The fishery has remained consistently active over the last 5 years, with thirteen 60 NM CAES blocks reporting up to four vessels across each season between 2017 – 2022 (DPIRD, 2022). The fishery is active across the Operational Area with one 10 NM CAES blocks reporting less than three vessels active between the 2018 – 2019 season (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the Operational Area and the EMBA.

Fishery	Potential for interaction During Activity		
	Operational Area	EMBA	Description
Pilbara Crab Managed Fishery	×	✓	The Pilbara Crab Managed Fishery management area overlaps the EMBA and Operational Area. FishCube data reports fishing effort occurs within the EMBA across one 60 NM CAES blocks reporting less than three vessels across 2017 – 2022 seasons (DPIRD, 2022). The FishCube data reported no active fisheries at 10 NM overlapping the Operational Area (DPIRD, 2022). Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.
Pilbara Trap Managed Fishery	×	✓	The Pilbara Trap Managed Fishery management area overlaps the EMBA and Operational Area. FishCube data reports fishing effort occurs within the EMBA across ten 60 NM CAES blocks reporting up to three vessels across 2017 – 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.
Marine Aquarium Managed Fishery	×	✓	The Marine Aquarium Managed Fishery management area overlaps the EMBA and Operational Area. The fishery has remained consistently active in the EMBA between the 2017 – 2022 seasons with seven 60 NM CAES blocks overlapping the EMBA reported up to six licences with active fishing effort (DPIRD, 2022). The FishCube data reported no active fisheries at 10 NM overlapping the Operational Area (DPIRD, 2022) Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.
Specimen Shell Managed Fishery	×	✓	The Specimen Shell Managed Fishery management area overlaps the EMBA and Operational Area. The fishery has remained consistently active in the EMBA between the 2017 – 2022 seasons with eleven 60 NM CAES blocks overlapping the EMBA reported up to six licences with active fishing effort (DPIRD, 2022). The FishCube data reported no active fisheries at 10 NM overlapping the Operational Area (DPIRD, 2022). Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.
West Coast Deep Sea Crustacean Managed Fishery	×	✓	The West Coast Deep Sea Crustacean Managed Fishery is permitted to fish in waters deeper than the 150 m isobath overlapping the Operational Area and EMBA. The fishery has remained consistently active in the EMBA between the 2017 – 2022 seasons with fourteen 60 NM CAES blocks overlapping the EMBA reported up to four vessels with active fishing effort (DPIRD, 2022). The FishCube data reported no active fisheries at 10 NM overlapping the Operational Area (DPIRD, 2022). Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.

Fishery	Potential for interaction During Activity		
	Operational Area	EMBA	Description
Western Australian Sea Cucumber Fishery	×	✓	The Western Australian Sea Cucumber Fishery management area overlaps the EMBA and the Operational Area. The fishery is permitted to operate throughout all WA waters. The target species typically inhabit nearshore waters and no effort occurs within the Operational Area. FishCube data reports fishing effort occurs within the EMBA across three 60 NM CAES blocks reporting less than three licenses across 2017 – 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.
Onslow Prawn Managed Fishery (Area 1 and 2)	×	✓	The Onslow Prawn Managed Fishery (Area 1 and 2) management area overlaps the EMBA and Area 2 management area overlaps the Operational Area. The boundaries of the Onslow Prawn Managed Fishery boundaries are all the Western Australian Waters between Exmouth Prawn Fishery and the Nickol Bay prawn fishery east of 114º39.9' on the landward side of the 200 m depth isobath (Sporer et al., 2012). Area two incorporates the Mangrove Island and Weld Island size management fish grounds and Coolgra Point Nursery (Sporer et al., 2012). FishCube data reports fishing effort occurs within the EMBA across five 60 NM CAES blocks reporting less than three licenses across 2018 – 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.
Pilbara Fish Trawl (Interim) Managed Fishery	×	✓	The Pilbara Fish Trawl (Interim) Managed Fishery management area overlaps the EMBA and the Operational Area. The fishery has remained consistently active over the last 5 years, with four 60 NM CAES blocks reporting up to four vessels across each season between 2017 – 2022 (DPIRD, 2022). No fishing effort has been reported in the 60 nm CAES blocks overlapping the Operational Area within the last 5 years (DPIRD, 2022). Accordingly, Woodside
West Coast Demersal Scalefish Fishery	×	✓	The West Coast Demersal Scalefish Fishery management area overlaps the EMBA. FishCube data reports fishing effort occurs within the EMBA across four 60 NM CAES blocks reporting up to eleven licenses across 2017 – 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery within the EMBA.

Fishery	Potential for interaction During Activity		
	Operational Area	EMBA	Description
Abrolhos Islands and Midwest Trawl Limited Entry Managed Fishery (Area 1)	×	✓	The Abrolhos Islands and Midwest Trawl Limited Entry Managed Fishery (Area 1) management area overlaps the EMBA. FishCube data reports fishing effort occurs within the EMBA in one 60 NM CAES block reporting up to four licenses across 2019 – 2021 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery within the EMBA.
Exmouth Gulf Prawn Managed Fishery	×	✓	The Exmouth Gulf Prawn Managed Fishery management area overlaps the EMBA. The fishery has remained consistently active over the last 5 years, with three 60 NM CAES blocks reporting up to six vessels across each season between 2017 – 2022 (DPIRD, 2022). No fishing effort has been reported in the 10 nm CAES blocks overlapping the Operational Area within the last 5 years (DPIRD, 2022). Accordingly, Woodside considers there to be potential for interaction with this fishery within the EMBA.
Exmouth Gulf Beach Seine and Mesh Net Managed Fishery	×	✓	There is no publicly available information on the extent of the management area for the Exmouth Gulf Beach Seine and Mesh Net Managed Fishery within the Exmouth Gulf. FishCube data reports fishing effort occurs within the EMBA across one 60 NM CAES block reporting less than three vessels across the 2017 - 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery within the EMBA.
Nickol Bay Prawn Managed Fishery	×	✓	The Nickol Bay Prawn Managed Fishery management area overlaps the EMBA. The fishery has remained consistently active over the last 5 years, with three 10 NM CAES blocks reporting up to eight vessels across each season between 2017 – 2022 (DPIRD, 2022). No fishing effort has been reported in the 10 nm CAES blocks overlapping the Operational Area or EMBA within the last 5 years (DPIRD, 2022). Accordingly, Woodside considers there to be potential for interaction with this fishery within the EMBA.
Gascoyne Demersal Scalefish Managed Fishery	×	✓	The Gascoyne Demersal Scalefish Managed Fishery management area overlaps the EMBA. FishCube data reports fishing effort occurs within the EMBA across six CAES blocks reporting up to twelve licenses across 2017 – 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.
Shark Bay Scallop Managed Fishery	×	✓	The Shark Bay Scallop Managed Fishery management area overlaps the EMBA. FishCube data reports fishing effort occurs within the EMBA across one 10 NM CAES block reporting up to fourteen licenses across 2017 – 2018 season (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area or EMBA (DPIRD, 2022). Accordingly, Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.

Fishery	Potential for interaction During Activity		
	Operational Area	EMBA	Description
Shark Bay Prawn Managed Fishery	×	✓	The Shark Bay Prawn Managed Fishery management area overlaps the EMBA. The fishery has remained consistently active over the last 5 years, with one 10 NM CAES block reporting up to seventeen vessels across each season between 2017 – 2022 (DPIRD, 2022). No fishing effort has been reported in the 10 nm CAES blocks overlapping the Operational Area or EMBA within the last 5 years (DPIRD, 2022). Accordingly, Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.
Shark Bay Crab Managed Fishery	×	✓	The Shark Bay Crab Managed Fishery management area overlaps the EMBA. The fishery has remained consistently active over the last 5 years, with one 10 NM CAES block reporting up to twenty vessels across each season between 2017 – 2022 (DPIRD, 2022). No fishing effort has been reported in the 10 nm CAES blocks overlapping the Operational Area or EMBA within the last 5 years (DPIRD, 2022). Accordingly, Woodside considers there to be potential for interaction with this fishery and the Petroleum Activities Program within the EMBA.
West Coast Rock Lobster Managed Fishery	×	✓	The West Coast Rock Lobster Managed Fishery management area overlaps the EMBA. FishCube data reports fishing effort occurs within the EMBA across six CAES blocks reporting up to fourteen licenses across 2017 – 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery within the EMBA.
Land Hermit Crab Fishery	×	✓	The Land Hermit Crab Management Area management area overlaps the EMBA where shoreline contact is predicted. FishCube data reports fishing effort occurs within the EMBA across two CAES blocks reporting up to three licenses across 2017 – 2018 and 2021 - 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery within the EMBA.
Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions	×	✓	There is no publicly available information on the extent of the management area for the Open Access Fishery, however, FishCube data reports fishing effort occurs within the EMBA across three 60 NM CAES blocks reporting less than three vessels across the 2017 - 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 NM CAES blocks overlapping the Operational Area (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery within the EMBA.
West Coast Demersal Gillnet & Demersal Longline Interim Managed	×	×	The West Coast Demersal Gillnet & Demersal Longline Interim Managed Fishery management area overlaps the EMBA. FishCube reported no fishing effort within the EMBA and Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.

Fishery	Potential for interaction During Activity		
	Operational Area	EMBA	Description
Western Australian Abalone Managed Fishery	×	×	The Western Australian Abalone Managed Fishery management area overlaps the EMBA and the Operational Area. The Western Australian Abalone Fishery includes all coastal waters from the Western Australian and South Australian border to the Western Australian and Northern Territory border. No commercial fishing has occurred north of Moore River since 2011-2012 (Strain et al., 2021). In addition, abalone is harvested by hand using an abalone iron from reefs and rock shelves within Western Australian waters (Strain et al., 2021), limiting the fishery to shallow waters. Accordingly, Woodside considers there to be no potential for interaction with this fishery.
Pearl Oyster Managed Fishery (Zone 1)	×	×	The Pearl Oyster Managed Fishery management area overlaps the EMBA and the Operational Area. No fishing has occurred in Zone 1 from 2017 to 2020 with only 4594 culture hells taken in 2016 (Hart et al., 2021). FishCube reported no fishing effort within the EMBA and Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.
South West Coast Salmon Managed Fishery	×	×	The South West Coast Salmon Managed Fishery management area overlaps the EMBA and the Operational Area. No fishing occurs north of the Perth Metropolitan Area. Therefore, no effort occurs within the Operational Area or EMBA and Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.
WA North Coast Shark Fishery	×	×	The WA North Coast Shark Fishery management area overlaps the EMBA and the Operational Area. The Operational Area 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). Therefore, Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.
Octopus Interim Managed Fishery	×	×	The Octopus Interim Managed Fishery management area overlaps the EMBA. FishCube reported no fishing effort within the EMBA and Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.
Charter based commercial operators			

Fishery	Potential for interaction During Activity		
	Operational Area	EMBA	Description
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 Murion Islands and at Barrow Island and the Montebello Islands. FishCube data reports consistent fishing effort across twenty-three 60 NM CAES blocks that overlap the EMBA (DPIRD, 2022). Fishing effort was reported by up to 20 licences across the 2017 – 2022 seasons (DPIRD, 2022). FishCube data reports fishing effort across one 10 NM CAES block that overlaps the Operational Area (DPIRD 2022). Fishing effort was reported by up to four vessels across the 2019 – 2022 seasons (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with tour operators will occur.

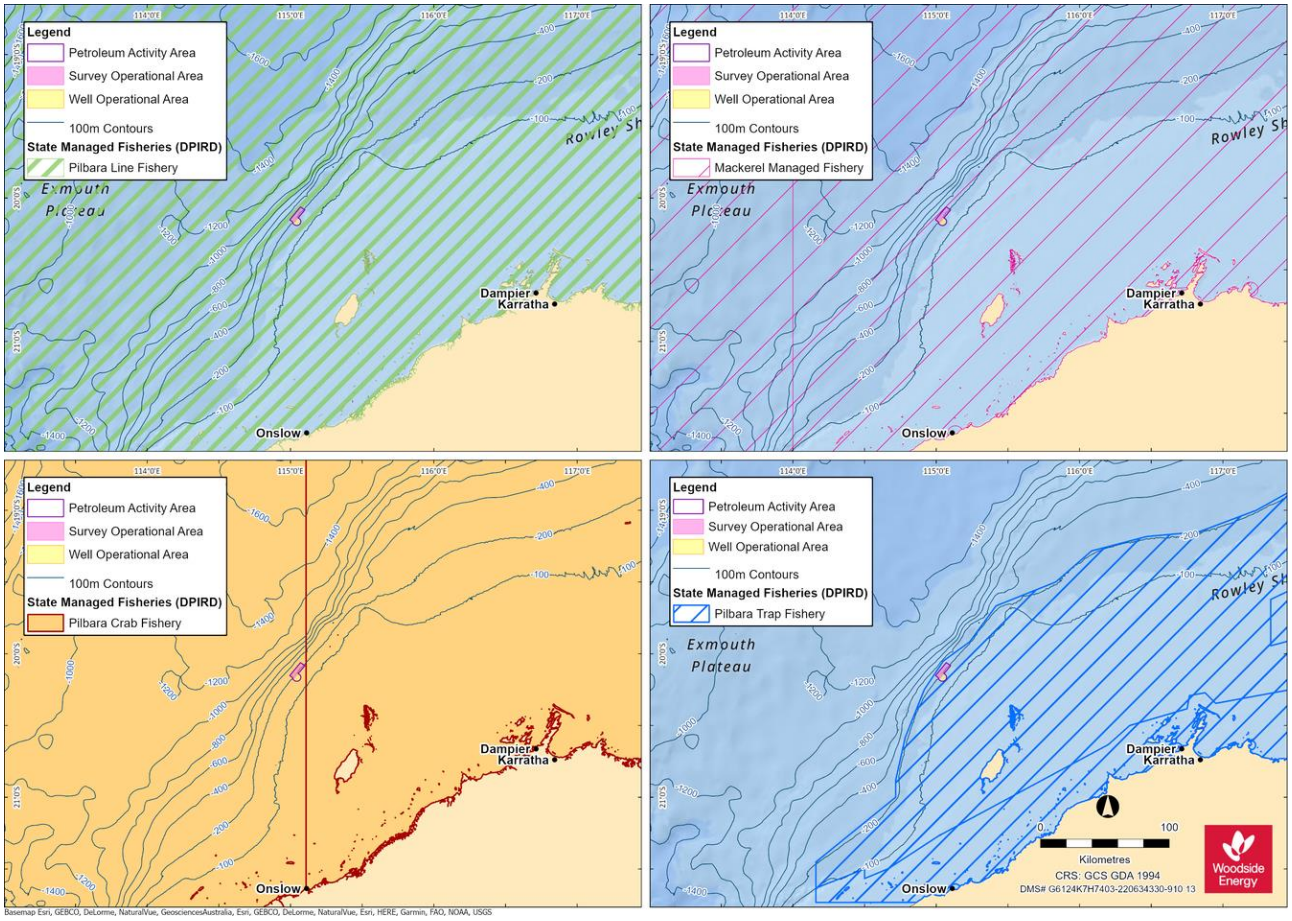


Figure 4-13: State managed fisheries with a potential for interaction with the petroleum activities program

4.9.4 Aquaculture

There are no aquaculture activities within or adjacent to the PAA. Aquaculture in the wider region is typically restricted to shallow coastal waters and consists primarily of culturing hatchery, reared and wild caught oysters (Pinctada maxima) for pearl production.

Pearl farm site locations nearest to the PAA, in the EMBA, are those at the Montebello Islands. In the Gascoyne Coast region oyster, hatcheries are important, with those located in Carnarvon and Exmouth supplying significant quantities of *P. maxima* spat to pearl farms in Exmouth Gulf and Montebello Islands (DoF, 2011b). Leases typically occur in shallow coastal waters at depths of less than 20 m (DoF, 2011b).

Primary spawning of the pearl oyster occurs from mid-October to December. A smaller secondary spawning occurs in February and March (Fletcher & Santoro, 2012).

4.9.5 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, Exmouth, Ningaloo Reef and the adjacent foreshores (in the wider EMBA) have a known history of fishing when areas were occupied (as from historical records). Areas that are covered by registered native title claims are likely to practice Aboriginal fishing techniques at various sections of the Western Australia coastline.

4.9.6 Tourism and Recreation

No tourism activities take place specifically within the PAA but it is acknowledged that there are growing tourism and recreational sectors in Western Australia. These sectors have expanded in area over the last couple of decades. Potential for growth and further expansion in tourism and recreational activities in the Pilbara and Gascoyne regions is recognised, particularly with the development of regional centres and a workforce associated with the resources sector (Gascoyne Development Commission, 2012).

Recreational fishing in the North West Shelf Province is mainly concentrated around the coastal waters and islands (including Dampier Archipelago, Ningaloo Marine Park, North West Cape area, the Montebello Islands, and other islands and reefs in the region) (DoF, 2011b). It has grown exponentially with the expanding regional centres and increasing residential and fly in/fly out work force, particularly in the Pilbara region. Occasional recreational fishing occurs at Rankin Bank and Glomar Shoals (located about 61 km and 187 km from the PAA, respectively). The Montebello Islands (50 km from the PAA) are the next closest location for tourism, with some charter boat operators taking visitors to these remote islands. Within the EMBA, 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 Marine Park and North West Cape area. Activities include recreational fishing, snorkelling and scuba diving, whale shark encounters (April to August) and manta rays (September to November), whale watching (July to October) and turtle watching (all year round) (Department of Biodiversity, Conservation and Attraction (DBCA), 2022). Recreational use of the Ningaloo Marine Park varies in intensity throughout the year, depending on school holidays and seasonal peaks of marine fauna being observed. Coral Bay is documented as one of the most heavily used areas (MPRA, 2005). Within the wider Socio-cultural EMBA, the northern Pilbara beaches provide fishing, swimming and boating opportunities as well the islands of the Dampier Archipelago.

4.9.7 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. None of these fairways intersect with the PAA; the nearest fairway is approximately 29 km east of the PAA (**Figure 4-14**). Vessel tracking data suggest the majority of shipping traffic in the area is likely associated with the ports of Dampier and Barrow Island.

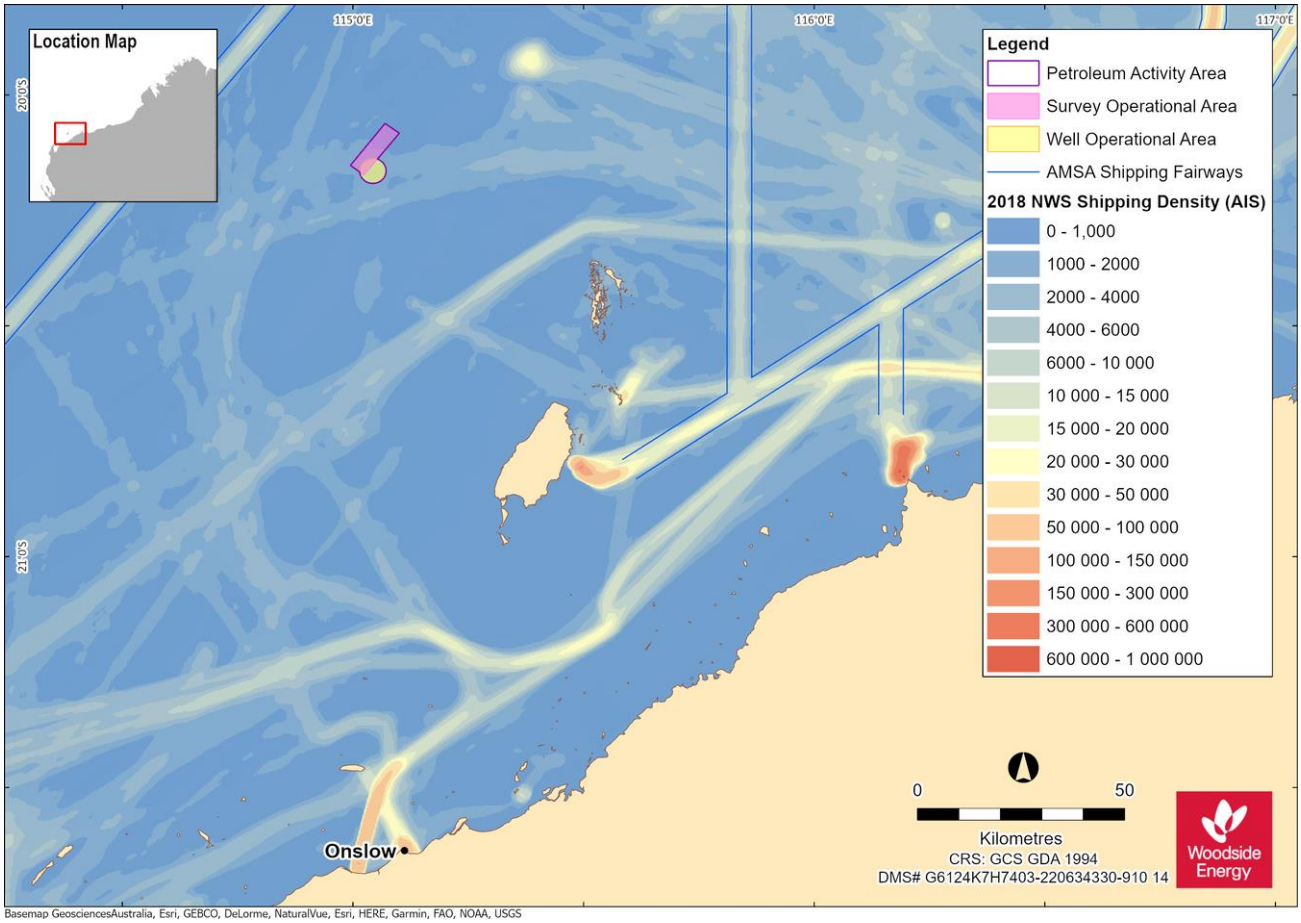


Figure 4-14: Vessel density map for the PAA, derived from AMSA satellite tracking system data (vessels include cargo, LNG tanker, passenger vessels, support vessels, and others/unnamed vessels)

4.9.8 Oil and Gas

The PAA is located within an area of established oil and gas operations, with additional infrastructure in the broader North West Shelf region (**Figure 4-15**). **Table 4-23** details other facilities located in proximity to the PAA. Subsea infrastructure is also present in the PAA, including the subsea wellheads, umbilicals and flowlines that form the Julimar Field Production System and intercept the north east portion of the PAA (**Figure 4-15**). Six abandoned appraisal wells with wellheads are also located in Permit Area WA-49-L (**Figure 4-15**).

Table 4-23: Other oil and gas operations located within the area

Facility Name and Owner	Approximate Distance from PAA
Pluto Platform (operated by Woodside)	30 km east north east
Wheatstone Platform (operated by Chevron)	33 km north east
John Brookes (operated by Quadrant Energy)	27 km south
East Spar (operated by Quadrant Energy)	55 km south

Goodwyn (operated by Woodside)	88 km north east
North Rankin (operated by Woodside)	110 km north east

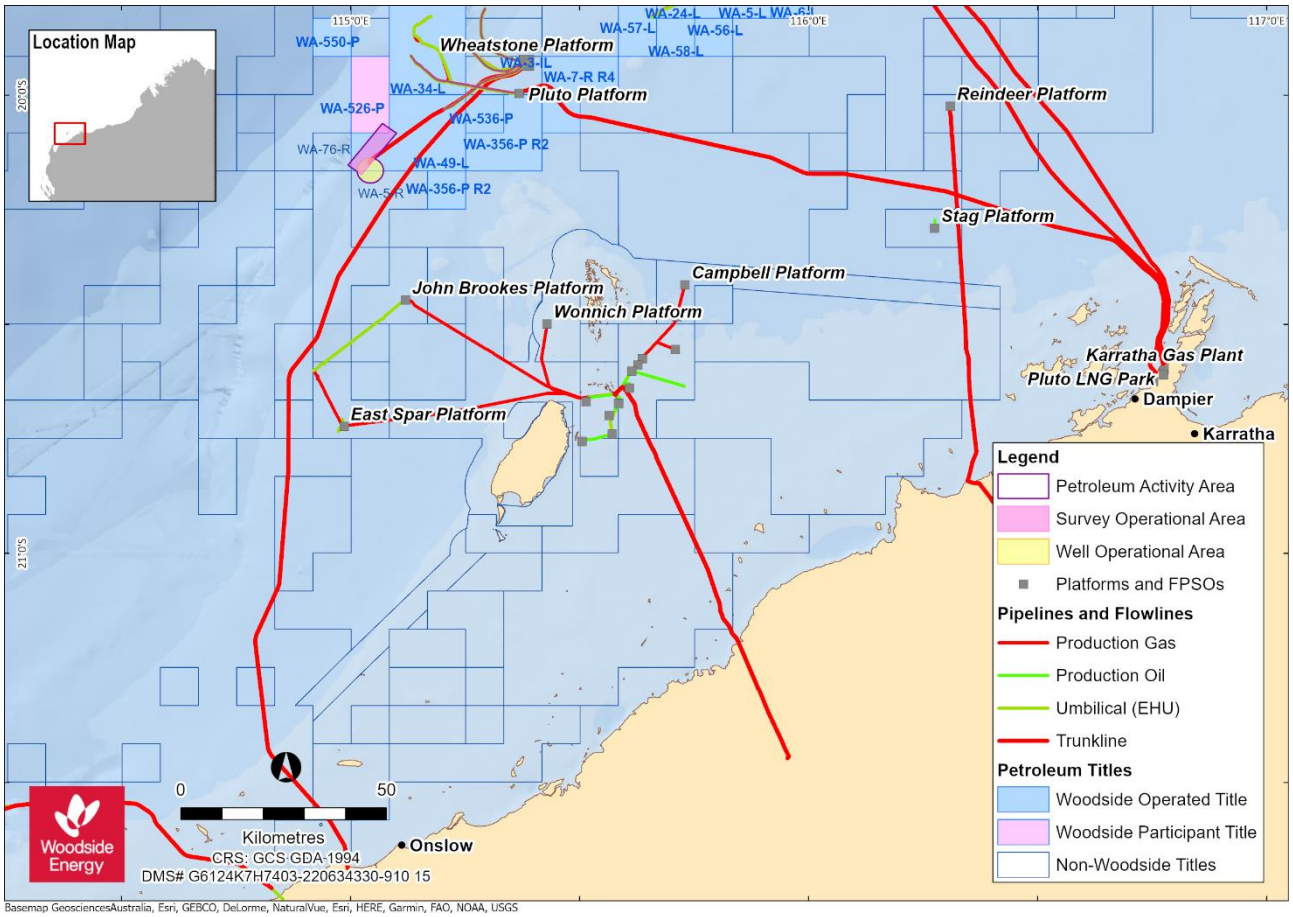


Figure 4-15: Oil and gas titles and infrastructure within the region

4.9.9 Defence

There are designated defence practice areas in the offshore marine waters off Ningaloo and the North West Cape in the EMBA. The PAA lies within the northern tip of one of these defence practice areas, the Royal Australian Air Force Base Learmonth (refer to **Figure 4-16**). The closest site where unexploded ordinance is known to occur is 8 km east of Trimouille Island in depths of about 40 metres, located about 66 km south east of the PAA.

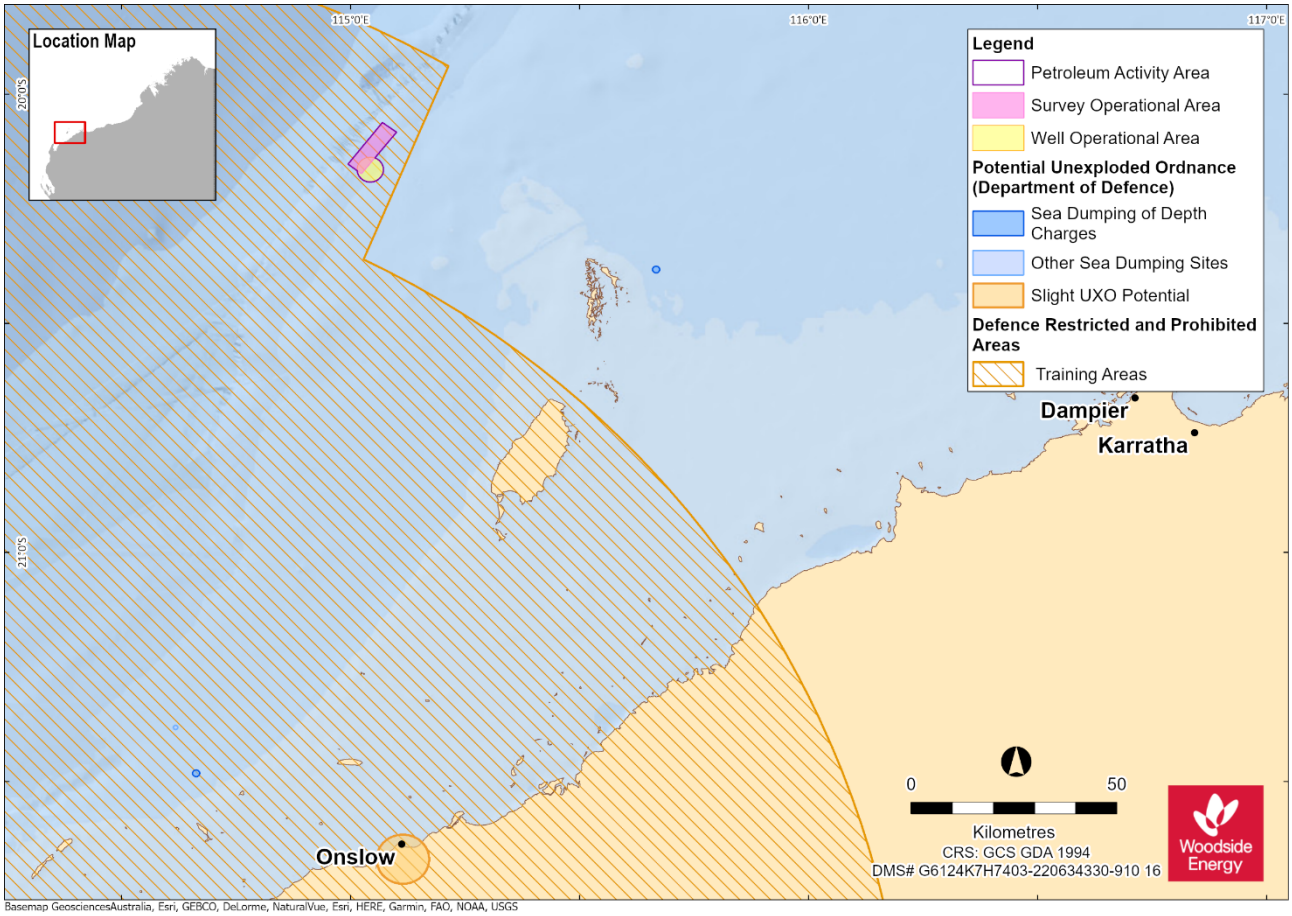


Figure 4-16: Defence training areas relative to the PAA

5 CONSULTATION

5.1 Summary

Woodside consults relevant persons in the course of preparing an EP. Woodside does this so authorities, persons or organisations that are potentially affected by proposed activities are consulted and their input is considered in the development of the environment plan, and also to assist Woodside in the identification of measures that could be applied to mitigate potential adverse environmental effects that the proposed activity may otherwise cause. Consistent with Regulation 3 of the Environment Regulations, consultation also supports Woodside's objective to ensure the environmental impacts and risks of the activity are reduced to ALARP and an acceptable level.

Persons or organisations whose functions, interests or activities may be affected by the proposed activity are well placed to assist in informing Woodside's approach to minimising harm to their respective social, economic and cultural interests and activities. During the development of this EP, consultation requirements have adapted and therefore consultation undertaken for this EP has transformed. For example, previously, consultation was understood to mean consultation on planned activities within the Operational Area and the EMBA (see **Section 4.1**) was used for engagement with response agencies related to unplanned events. This is further discussed in **Section 5.8**.

Woodside understands the interpretation of consultation requirements has transformed and it understands from regulatory guidance Titleholders should now consult persons or organisations on both planned and unplanned activities. For this Petroleum Activities Program (PAP), the broadest extent of the EMBA has been determined by reference to the highly unlikely event of a hydrocarbon release from the activities the subject of the PAP (see **Section 4.1**).

As discussed in **Section 4.1**, the EMBA is the composite of multiple theoretical paths of a slick or plume under various metocean conditions, meaning that in the highly unlikely event of a hydrocarbon release, 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. Woodside seeks to obtain this feedback from relevant persons through its consultation process, and in the highly unlikely event of an emergency response, Woodside would engage with these parties as appropriate to the nature and scale of the incident, as per the procedures and contact lists in the Oil Pollution Emergency Arrangements (Australia) and Oil Pollution First Strike Plan.

Woodside's consultation methodology is divided into three parts:

- The first section (**Sections5.2 5.2** to **5.6**) provides an overview of Woodside's consultation methodology for its EPs, including how we apply subregulation 11 A (1) of the Environment Regulations to identify relevant persons.
- The second section **(Section 5.75.7)** explains Woodside's application of the consultation methodology and Woodside's assessment of relevant persons for this EP.
- The third section **(Section 5.8)** details the consultation information provided to relevant persons, feedback provided and Woodside's assessment of merit of objections or claims. This section also includes engagement with persons or organisations that Woodside chose to contact.

Figure 5-1 provides an overview of Woodside's methodology to identify relevant persons.

•

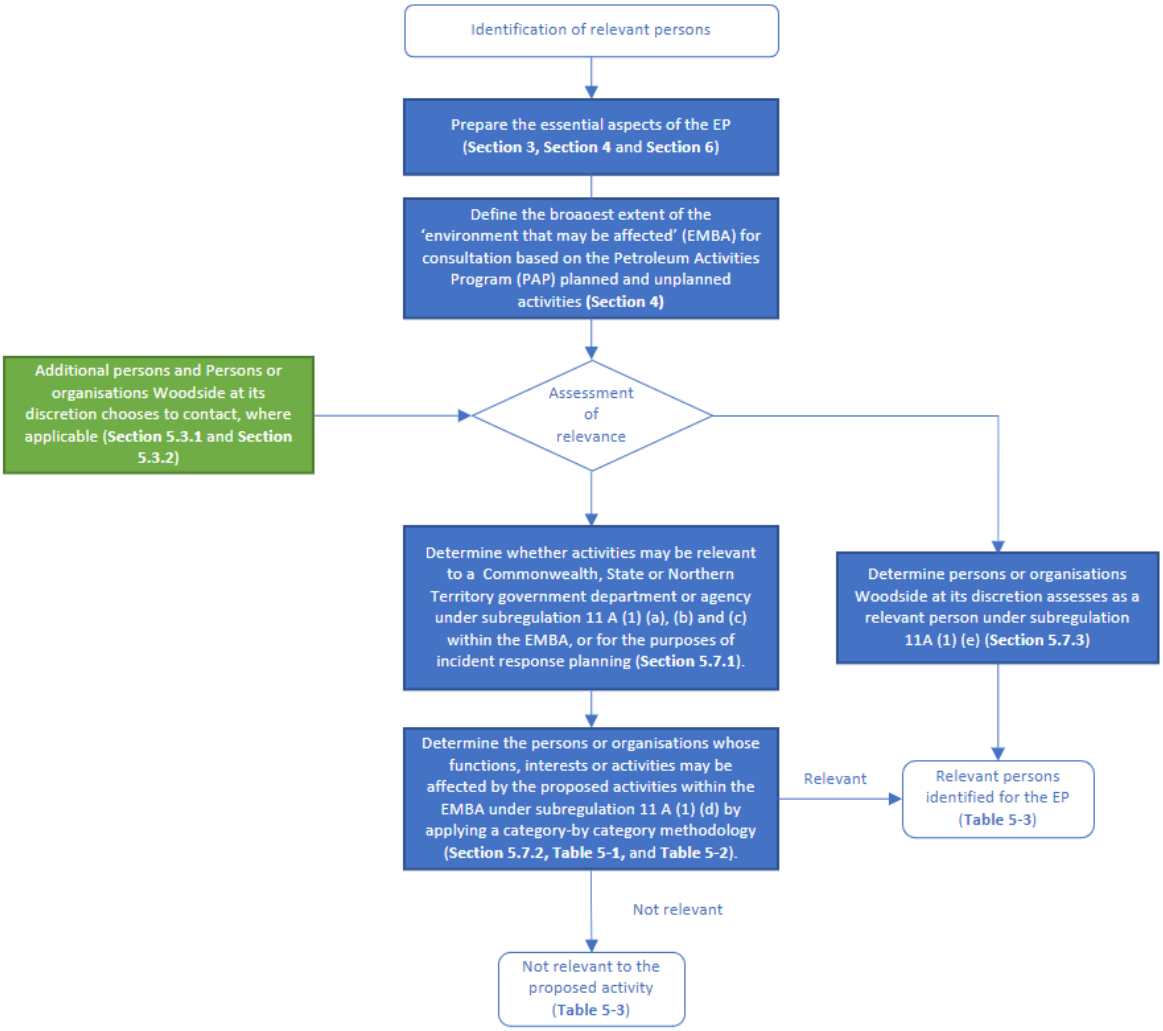


Figure 5-1: overview of Woodside's methodology to identify relevant persons.

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 understand the potential risks and impacts from our proposed activities and, to develop appropriate measures to manage them.

The length of time 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 the relevant 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 included in Woodside's consultation, the appropriate method of consultation for relevant persons and includes appropriate contact details, which are periodically reviewed and updated.

Woodside acknowledges NOPSEMA's draft *Consultation in the course of preparing an environment plan* guidance (December 2022) as well as recent judicial guidance (in the Full Federal Court's decision in *Santos NA Barossa Pty Ltd v Tipakalippa* [2022] FCAFC 193*)* 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.*

Woodside notes that consultation is voluntary and does not carry with it any obligation either to seek or to reach agreement on the subject for consultation. Woodside understands that in any community consultation there might be persons within a group who could not participate for various reasons and the absence of their participation does not invalidate the process provided that reasonable efforts were made to identify the relevant persons and to consult with them.

In order to undertake consultation, Woodside has a methodology for identifying relevant persons, in accordance with subregulation 11 (A) 1. This methodology reflects NOPSEMA's recent draft guidance and demonstrates that, in preparing the EP, to meet the requirements of Regulation 10 A (criteria for EP acceptance), Woodside properly understands:

- our planned activities in the Operational Area which describes the area in which our planned activities are proposed to occur (see **Section 3.3**); and
- 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 seeks to carry out consultation in a manner that:

- is consistent with the principles of ecologically sustainable development (ESD) set out in section 3A of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
- is intended to reduce the environmental impacts and risks from the activity to as low as reasonably practical.
- seeks to ensure the environmental impacts and risks of the activity will be of an acceptable level.
- ensures relevant persons are identified and consulted in the course of preparing the EP.
- develops and makes available sufficient information to allow each relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.

-

- notifies the relevant person of the proposed activities, respecting that consultation is voluntary. Where the relevant person seeks further engagement, Woodside collaborates with the relevant person to determine the preferred method of consultation, where practical, with the aim of seeking genuine and meaningful two-way dialogue.
- allows each relevant person a reasonable period for consultation.
- informs the relevant person that they may request their feedback not to be published.
- considers feedback from relevant persons that assists in informing an assessment process with the objective of minimising harm to the relevant person and the environment from the proposed petroleum activities.
- is informed by the consultation of appropriate measures that may be taken to mitigate the potential adverse environmental impacts that the petroleum activity may otherwise cause.
- demonstrates the measures (if any) adopted or proposed to be adopted by Woodside because of the consultation as appropriate.
- is part of Woodside's record of all engagements.
- provides opportunities for relevant persons and additional persons, where applicable, to provide feedback during the life of the EP through its ongoing consultation process (refer to **Section 5.6** and **Section 7.8.2.1**).

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

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

NOPSEMA:

- *GL2086 – Consultation in the course of preparing an environment plan – December 2022*
- *GN1847 - Responding to public comment on environment plans - July 2022*
- *GN1344 - Environment plan content requirements - September 2020*
- *GL1721 - Environment Plan Decision Making Guideline - December 2022*
- *GN1488 - Oil pollution risk management - July 2021*
- *GN1785 – Petroleum activities and Australian Marine Parks – June 2020*

*GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2023*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 and Water Resources:

- 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
- Engage early – guidance for proponents on best practice Indigenous engagement for environmental assessments under the EPBC Act

5.3 Identification of Relevant Persons for Consultation

Woodside has a methodology for identifying relevant persons to be consulted in accordance with subregulation 11 A (1) of the Environment Regulations which provides that in the course of preparing an EP, a titleholder must identify and consult each of the following (a ***relevant person***):

- each Department or agency of the Commonwealth to which the activities to be carried out under the EP, or the revision of the EP, may be relevant.
- each Department or agency of a State or the Northern Territory to which the activities to be carried out under the EP, or the revision of the EP, may be relevant.
- the Department of the responsible State Minister, or 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, or the revision of the EP.
- any other person or organisation that the titleholder considers relevant.

In order to identify a relevant person for the purposes of subregulation 11 A (1) (d), the meaning of "functions, interests or activities" needs to be understood. In subregulation 11A(1)(d), the terms "functions, interests or activities" is to be construed broadly and consistently with the regulatory objects of the OPGGS Regs (Regulation 3) and the objects of the EPBC Act (Section 3A).

In developing its methodology for consultation, Woodside acknowledges the current guidance on the definition of functions, interests and activities is as follows:

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 4 of the Environment Regulations and is likely be directed to what the relevant person is already doing.

Woodside's identification of relevant persons for consultation comprises its:

- initial assessment of relevant persons during development of the EP;
- assessment of additional persons following Woodside's initial assessment and consultation with relevant persons (see **Section 5.3.1**); and

•

- assessment of persons or organisations Woodside chooses to contact (see **Section 5.3.2**).

As discussed in **Section 5.3.15.1** and **Section 5.3.2**, to identify relevant persons to consult with on our proposed activity, Woodside's methodology assesses relevance of a person or organisations functions, interests or activities based on overlap with the Combined EMBA to identify persons or organisations that may be affected by Woodside's proposed planned or unplanned activities. This includes government departments or agencies that may either 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.

For incident response planning, Woodside consults with the Marine Pollution branch of the Australian Maritime Safety Agency (AMSA), as it administers and activates the National Plan under which Woodside holds a Memorandum of Understanding (MoU), and the relevant State department or agency for hydrocarbon release which are predicted to enter State waters. For example, the WA Department of Transport is consulted if the EMBA associated with the worst-case hydrocarbon release is predicted to enter Western Australian State waters as it has the role of Hazard

Management Agency, Jurisdictional Authority and Controlling Agency. In the event the EMBA from a worst-case hydrocarbon release is predicted to enter port limits, the relevant port authority is also consulted as it will hold the role of Controlling Agency for a worst-case hydrocarbon release within port limits.

Should it be identified that persons or organisations such as, but not limited to, commercial fishers, tourism operators or relevant cultural authorities who may have values or sensitivities that may be affected within the specific part of the EMBA (see **Section 4**), Woodside would, at the relevant time of this unlikely event occurring, engage in the context of emergency response with these parties as appropriate to the nature and scale of the incident, as per the procedures and contact lists in the Oil Pollution Emergency Arrangements (Australia) and Oil Pollution First Strike Plan (see **Appendix D**).

5.3.1 Assessment of Additional Persons

The methodology also allows for additional persons to be identified during the course of preparing the EP. Additional persons are persons or organisations identified following Woodside's initial assessment and consultation with relevant persons. Additional persons could be identified:

- as part of Woodside's regular monitoring and review;
- by additional persons contacting Woodside and self-identifying;
- advertising in a selected local, state and national newspapers;
- persons or organisations identify others that should be consulted; and
- by third parties, regulators or industry providing relevant information to Woodside.

If additional persons are identified, 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 5.7**). The result of Woodside's assessment of relevance during the development of the EP is outlined at

-

Table 5-3.

Should feedback be received following EP acceptance, Woodside has an ongoing consultation approach (refer to **Section 5.6** and **Section 7.8.2.1**), whereby feedback and comments received continue to be assessed and responded to, as required, in accordance with the intended outcome of consultation (as set out in **Section 5.2**).

Should consultation feedback be received following EP acceptance that identifies a significant measure or control that requires implementation or update to meet the intended outcome of consultation (see **Section 5.25.2**), Woodside will apply its Management of Change and Review process (see **Section 7.6**).

5.3.2 Persons or organisations Woodside chooses to contact

Persons or organisations that Woodside chooses to contact are persons or organisations, where for example, Woodside:

- has assessed as 'not relevant' under its methodology for subregulation 11 A (1) but has chosen to seek additional guidance, for example, to inform the correct contact person for Woodside to consult, or engage due to guidance from, for example, a relevant person or the Regulator.
- has assessed as 'not relevant' under its methodology for subregulation 11 A (1) but have been contacted as a result of consultation requirements changing, updated guidance from the Regulator and consultation methodology undertaken for this EP having transformed (see **Section 5.8.2**).
- is unclear what a person or organisation's functions, interests or activities are, or whether their functions, interests or activities may be affected. Therefore, 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 5-1** and **Section 5.7**). The result of Woodside's assessment of relevance during the development of the EP is outlined at **Table 5-3.**

An example of where Woodside may choose to contact a person or organisation is where its methodology may not identify a fishery licence holder or fishery representative body as a relevant person. This may be, for example, because there is no overlap with the EMBA and potential impact to the functions, interests or activities of the fishery licence holder or fishery representative body in accordance with Woodside's methodology for identifying relevant persons. Woodside has previously received advice from AFMA that it expects Titleholders to consult all Commonwealth fishers who have entitlements to fish within the proposed area, which can be done through the relevant fishing industry associations or directly with fishers who hold entitlements in the area. Whilst this may be outside of Woodside's methodology for assessing relevant persons, Woodside may, at its discretion, choose to exceed the consultation required under Regulation 11 A by, for example, seeking feedback, advice or providing information consulting with or providing information to the fishery licence holder or fishery representative body and inviting feedback from them, separate to the discretion under subregulation 11 A (1) (e) which assesses the person or organisation as a relevant person.

5.4 Consultation Material and Timing

Subregulation 11 A (2) provides that a Titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. Subregulation 11 A (3) provides that the titleholder must allow a relevant person a reasonable period

for the consultation Woodside prepares, and takes feedback on, its consultation material in a manner which is consistent with the intended outcome of consultation (as set out in **Section 5.25.2**).

As set out in **Section 5.25.2**, Woodside notifies relevant person or additional persons, where applicable, of the proposed activities, respecting that consultation is voluntary 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 (see **Section 5.25.2**). 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 as appropriate and is also available on Woodside's website for interested parties to access and to provide feedback on. The Consultation Information Sheet typically includes a description of the proposed petroleum activity, the Operational Area where the activity will take place, timing and duration of the activity, a location map of the Operational Area and EMBA, a description of the EMBA being the highly unlikely worst-case credible hydrocarbon release scenario, relevant exclusion zones as well as a summary of relevant risks mitigation and/or management control measures relevant to the proposed petroleum activity. It also sets out contact details to provide feedback to Woodside.

Targeted consultation material is also developed which is appropriate to the category of persons, such as specific information sheets or presentation material. This targeted consultation material may be provided to relevant persons or persons Woodside chooses to contact in addition to, or in place of, the Consultation Information Sheet, as appropriate. This may include, for example, providing commercial fishing licence holders and representative bodies with additional information relevant to their fishery or bespoke Consultation Information Sheets or presentations to Traditional Custodians, as appropriate.

As Woodside has been operating for more than 30 years and many persons or organisations have been consulted on other EPs or Woodside business, Woodside has a high level of understanding of how those persons or organisations wish to be engaged. Woodside utilises a range of tools to consult with relevant persons appropriately, which may include one or more of the following methods and tools:

- Consultation Information Sheet available on Woodside's website
- Bespoke 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.

As described in **Section 5.3.1** Woodside places advertisements in a 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 how a person or organisation can provide feedback. Woodside considers this an appropriate mechanism for persons or organisations with interest in Woodside's activities to make themselves known to Woodside. Advertising in the local paper in the area of the activity is also consistent with the public notification process under section 66 of the *Native Title Act 1993* for native title applications. Woodside typically aligns advertisement feedback timeframes, with the timing described below. Feedback received is assessed in accordance with **Section 5.7** to determine relevance and evidenced in **Table 5-3** as appropriate.

Woodside recognises 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. Woodside considers that relevant persons who may be impacted by planned activities in the Operational Area, for example as a result of temporary displacement due to exclusion zones, may require more targeted information relevant to their functions, interests or activities. Comparatively, persons or organisations that may have an interest in the proposed activity but whose ability to continue to conduct their functions or activities does not have the potential to be directly impacted, may not require the same level of information or targeted materials as well as those persons or organisations within the broader EMBA who may only be affected in the highly unlikely event of a hydrocarbon release, and would at the time of the highly unlikely event occurring, be engaged with regard to the emergency response subject of the nature and scale of the incident.

Woodside recognises information may need to be provided to relevant persons in an iterative manner during the consultation process. Woodside considers in line with the intent of consultation (see **Section 5.25.2**), the threshold for genuine two-way engagement is met via feedback on incorporation of controls, where applicable, being provided to the relevant person to ensure the relevant persons understands how their input has been considered in the development of the EP.

Information which is provided to relevant persons for the purposes of consultation on this EP is summarised at **Table 5-4. Table 5-4** also sets out the information which is provided to: additional persons (see **Section 5.3.1**) who are assessed as not relevant for the purposes of subregulation 11(A) and also to persons or organisations that are not relevant for the purposes of subregulation 11 (A) but which Woodside has chosen to contact (see **Section 5.3.2**).

When engaging in consultation, Woodside notifies relevant persons that, in accordance with subregulation 11 A (4), the relevant person may request that particular information the person or organisation provides in the consultation not be published and information subject to that request will not be published. Woodside also applies this subregulation to consultation with additional persons assessed as not relevant, and engagement with persons or organisations that are not relevant but which Woodside chooses to contact.

5.4.2 Sufficient time

Woodside's consultation arrangements provide a feedback period for relevant persons during the course of developing the EP for initial submission. This feedback period is typically up to 30 days from the date of the consultation information being provided to the relevant person to review and respond to proposed activities. A 30-day period has been selected because it gives relevant persons a target date for certainty as to when consultation closes. It also allows for Woodside to consider, and if appropriate, incorporate into the EP, appropriate measures communicated during consultation to mitigate adverse environmental effects that the petroleum activity might otherwise cause. The 30-day period is also consistent with the improved consultation and transparency provisions in Division

2.2B of the OPGGS Regulations and has been adopted by NOPSEMA when engaging in public consultation on seismic activities [Guidance Note N-04750-GN1847]. Woodside has taken this as confirming a 30-day period is a reasonable period for consultation.

Woodside recognises that availability and accessibility issues may require additional time being afforded to relevant persons to provide feedback in accordance with the intended outcome of consultation (see **Section 5.25.2**). Woodside assesses requests for additional time on a case-by-case basis, with consideration of the nature and scale of the activity, the reason for the request, and the reasonableness of the request. Where, for example, it is clear that the request for a time extension is not made in accordance with the intended outcome of consultation (see **Section 5.2**) or as part of a genuine two-way engagement, but rather a reasonable person would interpret the request as an attempt to delay submission of the EP, the request will not be accepted.

Woodside typically follows up with relevant persons to provide feedback on the proposed activity around one week prior to the feedback period ending. Where available and appropriate to the category of person or organisation being consulted, Woodside will endeavour to use an alternative method of communication to contact the relevant person. At all times, Woodside respects that consultation is voluntary and does not carry with it any obligation either to seek or to reach agreement on the subject for consultation.

Woodside acknowledges that it may be limited in the mediums by which it is able to consult relevant persons due to the contact details that are made available by the relevant person. For example, the Western Australian Department of Primary Industries and Regional Development (DPIRD) has responsibility for managing the *Fish Resources Management Act 1994*, which limits the provision of contact details from the register to the name and business address of fishery licence holders and alternative methods of communication, such as email addresses, are at the licence holders' discretion to provide to Woodside.

Consistent with the approach adopted in the Environment Regulations and by NOPSEMA as part of the public consultation process, if comments are received after the closing date for feedback, those comments may not be able to be considered or incorporated in the preparation of appropriate control measures to be included the EP prior to submission. However, as detailed in **Section 5.6** and **Section 7.8.2**, if comments and feedback is received after the EP has been submitted, Woodside is open to considering those comments and feedback on its EPs and update controls as appropriate, at all stages during the life of the EP.

As described in **Section 5.3.1**, despite best endeavours to identify all relevant persons before preparing the EP, additional persons may never-the-less be identified at a later stage, and in particular following initial submission of the EP, and be determined by Woodside to be a relevant person. Should this occur, Woodside's approach to consultation is that the person or organisation will be contacted (unless the person has self-identified), provided with information relevant to their interests, and invited to provide feedback about the proposed activity.

5.5 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.

Woodside consults widely on its EPs and notes feedback is received in various forms. Feedback considered inappropriate or 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.

Similarly, Woodside accepts feedback and engages in consultation in order to achieve the aims set out in **Section 5.2** Woodside recognises 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. If it becomes clear that relevant persons or additional persons are engaging with Woodside to further that end or are engaging in a manner that is not achieving the aims set out in **Section 5.25.2**, for instance, by asserting an aim to stop Woodside's operations or aims seeking to shut down Woodside's operations or a proposed activity, consultation will not be considered to form part of the consultation required under Regulation 11 A. In those instances, feedback will never-the-less continue to be received and ongoing consultation as set out in **Section 5.65.6** and **Section 7.8.2.1** will be continued, as appropriate.

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 5.25.2,** 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 acknowledges there may be times where the relevant person does not consider matters raised during feedback have been adequately addressed. However, where Woodside considers the feedback provided does not demonstrate reasonable or practical measures to further manage impacts and risks to ALARP and acceptable levels, Woodside will consider consultation to be complete.

Table 5-4 includes Woodside's consideration of the information provided during consultation from relevant persons, the merits of objections or claims, and, where appropriate, changes incorporated in the EP as a result of the feedback.

In accordance with subregulation 9 (8) of the OPGGS(E)R sensitive information (if any) in an EP, and the full text of any response by a relevant person to consultation under regulation 11 A in the course of preparation of the plan, must be contained in the sensitive information part of the plan and not anywhere else in the plan.

5.6 Ongoing Consultation

As noted above, there is typically a 30-day period for relevant persons to provide feedback to Woodside in order for that feedback to be considered during the preparation of the EP. However, consultation can also continue to occur during the life of an EP. Ongoing consultation can also assist in achieving the aims of consultation (as set out in **Section 5.25.2**) and also enables updates on activities and controls to be made and a continued understanding of relevant persons or organisations views to be received.

As per Woodside's ongoing consultation approach (refer to **Section 7.8.2.1**), feedback and comments received from relevant persons and additional persons continue to be assessed and responded to, as required, through the life of an EP, including during EP assessment and throughout the duration of the accepted EP, in accordance with the intended outcome of consultation (as set out in **Section 5.25.2**).

Should consultation feedback be received following EP acceptance that identifies a measure or control that requires implementation or update to meet the intended outcome of consultation (see **Section 5.25.2**), Woodside will apply its Management of Change and Review process as appropriate (see **Section 7.6**).

Woodside has established and maintains a publicly available interactive map to provide persons or organisations with updated information on activities being conducted as part of the Petroleum

Activities Program particularly during SIMOPS. The interactive map is available on Woodside's website (**Section 6.7.5, PS 6.2**).

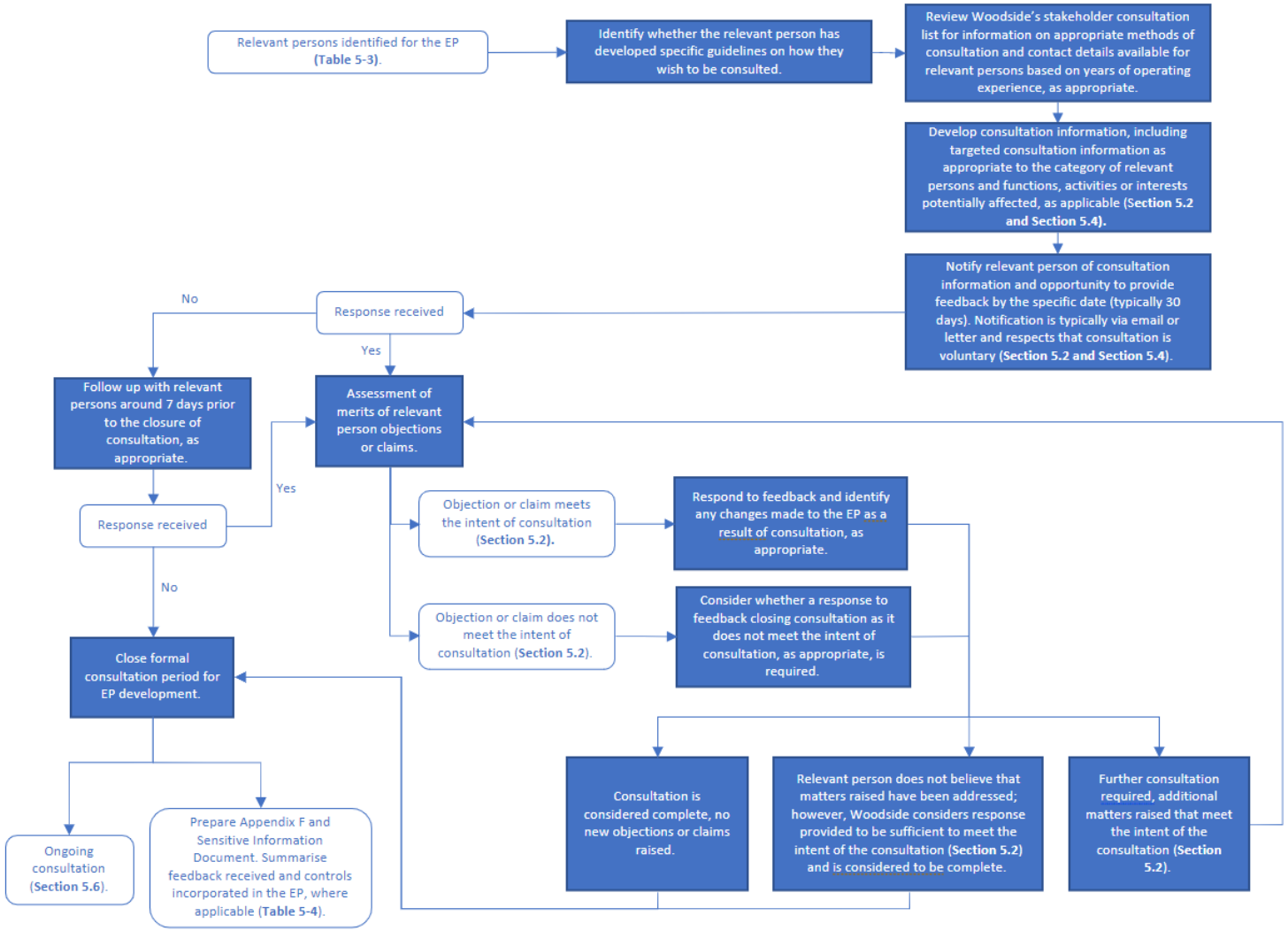


Figure 5-2: Overview of Woodside's consultation approach.

5.7 Identification of Relevant Persons for this EP

5.7.1 Identification of relevant persons under subregulation 11 A (1) (a), (b) and (c)

The relevant inquiry for determining relevant persons within the description of subregulation 11 A (1) (a), (b) and (c) is whether the activities to be carried out under the EP may be relevant to one of the government departments or agencies in those subregulations.

Woodside's methodology for identifying relevant persons under these categories 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 departments and agencies is formulated by reference to the responsibilities of the government departments as set out on their websites, in NOPSEMA's GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area guideline (March 2022) 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 in relation to the departments and agencies which Woodside has historically consulted over the years. This list is revised from time to time for example to accommodate government restructures, renaming of departments, shifting portfolios and 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 (as set out in **Section 5.25.2**).
- The list of those government departments and agencies assessed as relevant is set out in **Table 5-3**.

-

- Feedback received, if any, is assessed in accordance with the intended outcome of consultation (as set out in **Section 5.2**) and summarised at **Table 5-4** 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. For instance, in this EP, Woodside has not consulted with the department for the Minister of the Northern Territory because there is no overlap given that the proposed activities are in Commonwealth waters offshore of Western Australia.

5.7.2 Identification of relevant persons under subregulation 11 A (1) (d))

Relevant persons under subcategory 11 A (1) (d) are defined as a person or organisation whose functions, interests or activities may be affected by risks and impacts which are specific to the proposed petroleum activities to be carried out under the EP, or the revision of the EP. The activities to be carried out under this EP are the planned activities described in **Section 3**. Woodside also considers the environment that may be affected (EMBA) by unplanned activities (i.e. hydrocarbon release), identified in **Section 4**, assessed in **Section 6** and summarised for consultation purposes in **Section 5.7.4.**

To identify relevant persons who fall within the description of subcategory 11 A (1) (d), Woodside adopts the following methodology, with consultation undertaken with relevant persons in accordance with **Section 5.25.2**.

- Woodside assesses relevance based on overlap with risks and impacts from its proposed petroleum activities within the EMBA.
- This assessment will include applying professional judgement, knowledge and current literature and will vary depending on the type of person or organisation and as such, the relevant persons are determined by category as described in **Table 5-1** and identification methodology applied as set out in **Table 5-2**.
- The list of those persons or organisations assessed as relevant is set out in **Table 5-3**.
- Feedback received, if any, is assessed in accordance with the intended outcome of consultation (as set out in **Section 5.25.2**) and applying the categories of relevant persons methodology outlined in **Table 5-2**, as appropriate. Feedback is summarised at **Table 5-4**.

Table 5-1: Categories of relevant persons

Category	Explanation
Commercial fisheries 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.

-

Category	Explanation
Peak idustry representative bodies	Recognised peak organisation(s) for the oil and gas sector.
Traditional Custodians	In line with Native Title Law, Traditional Custodians are required to be a descendent, self-identify and be recognised by the Traditional Custodian group.
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* which is responsible for representing the local community. Recognised local community reference/liaison group or organisation in relation to oil and gas matters.
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.
Additional persons	Additional persons are persons or organisations identified following Woodside's initial assessment and consultation with relevant persons (see **Section 5.3.1**).

Table 5-2: Methodology for identifying relevant persons within the EMBA undertaken under subcategory 11 A (1) (d) – by category

Category	Relevant person identification methodology
Commercial fisheries (Commonwealth and State) and peak representative bodies	Woodside assesses relevance for commercial fisheries (Commonwealth and State) and their representative bodies using the following next steps in its methodology: • Defining the parameters having regard to timing, location and duration of the proposed petroleum activity. • Confirming whether the EMBA overlaps with the fisheries management area (i.e. the spatial area the fishery is legally permitted to fish in) (see **Section 4.1**). • Woodside acknowledges WAFIC's consultation guidance[4] (accessed on 2 February 2023), 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 H**). • In line with WAFIC's advice, for State commercial fisheries, Woodside assesses the potential spatial and temporal extent for interaction with the fishery by reviewing AFMA ABARES and DPIRD Fishcube data to assess whether the fishery has been active within the Operational Area in the past

[4] Consultation Approach for Unplanned Events - WAFIC

Category	Relevant person identification methodology
	5 years and reviewing Woodside's Master Existing Environment to assess the fisheries water depth, species pelagic distribution and fishing method as applicable. • For Commonwealth commercial fisheries, Woodside assesses the potential spatial and temporal extent for interaction with the fishery by reviewing AFMA ABARES and DPIRD Fishcube data to assess whether the fishery has been active within the EMBA in the past 5 years and reviewing Woodside's Master Existing Environment to assess the fisheries water depth, species pelagic distribution and fishing method as applicable. Assessment of relevance: • State commercial fisheries that have been active in the past 5 years within the Operational Area and are assessed as having a potential for interaction based on fishing method or specific pelagic distribution are identified as relevant to the proposed activity. • Commonwealth commercial fisheries that have been active in the past 5 years within the EMBA and are assessed as having a potential for interaction based on fishing method or specific pelagic distribution are identified as relevant to the proposed activity. • If Woodside has identified that a Commonwealth or State fishery is a relevant person, then Woodside also consults the fisheries relevant representative body. For example, WAFIC represents the interests of State fisheries in Western Australia. If a state fishery is identified as relevant, Woodside would also identify WAFIC as relevant. Recognised Commonwealth fishery representative bodies are identified by AFMA via its website. WAFIC is the only recognised state fishery representative body.
Recreational marine users and peak representative bodies	Woodside assesses relevance for recreational marine users and peak representative bodies using the following next steps in its methodology: • From Woodside knowledge and operating experience, knowledge of recreational marine users in the area. This assessment is both activity and location based. • Defining the parameters having regard to timing, location and duration of the proposed petroleum activity. • Assessing 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.

•

Category	Relevant person identification methodology
Titleholders and Operators	Woodside assesses relevance for other Titleholders and Operators using the following next steps in its methodology: • Using 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 of peak industry representative bodies responsibilities that Woodside actively participates in, with consideration of overlap between industry focus area and Woodside's proposed activities within the EMBA. • Review of Woodside's existing consultation list. • Website search to identify whether any additional peak industry representative bodies have been created whose responsibilities may overlap with Woodside's proposed activities within the EMBA. Assessment of relevance: • Peak industry representative bodies whose responsibilities are identified as having an overlap with Woodside's proposed activities within the EMBA are assessed as relevant.
Traditional Custodians	Consistent with its understanding of the matters discussed in **Section 4.9**, Woodside assesses relevance for Traditional Custodians using the following next steps in its methodology: • In line with Native Title Law, Traditional Custodians are required to be a descendent, self-identify and be recognised by the Traditional Custodian group. As Woodside has more than 30 years of operating experience, over the years, it has undertaken extensive engagement with recognised Traditional Custodians for its operations. • Using database of the National Native Title Tribunal to determine whether there's any Native Title Claim (historical or current) or Determination overlapping or coastally adjacent to the EMBA. Native Title Claims are understood to represent the lands and waters over which Indigenous groups claim rights (including rights to conduct activities) and interests, and Native Title Determinations are understood to represent the lands and waters over which their representative institutions have certain functions (see **Section 5.1**). Representatives of Native Title Claims that have been dismissed are not considered relevant persons under subregulation 11 A (1) (d), but may be captured under subregulation 11 A (1) (e). • Where appropriate, contacting the relevant land council or Native Title Representative Body to request a list of any Traditional Custodian groups asserting Traditional Custodianship over an area of coastline adjacent to the EMBA who do not and have never had a native title claim or

•

Category	Relevant person identification methodology
	determination of which land council or Native Title Representative Body are aware. • Review of relevant Indigenous Land Use Agreements (ILUA) by which Aboriginal organisations or Traditional Custodian Groups have made a voluntary agreement regarding the use or management of areas of land or water overlapping the EMBA (see **Section 4.9**). ILUAs are registered with the Native Title Tribunal and provide additional indications of Traditional Custodian rights and interests. • 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. • Woodside acknowledges and respects that Indigenous people's traditional rights are held as group and communal rights. Legal recognition of Traditional Custodian rights in land and waters occurs through the Native Title Act 1993 (Cth) which was enacted in response to the High Court's Mabo decision in 1992. That decision held that rights and interests in land and waters "are possessed under the traditional laws acknowledged by and the traditional customs observed by the Indigenous inhabitants". Traditional laws and customs are held by the Indigenous group (society) as a whole. In certain instances, an individual may hold particular rights and interests in relation to a site or area that are distinct from that of the broader group, however, these rights and interests must be derived from the traditional laws and customs and must be recognised by the broader group. • The principles of Free, Prior and Informed Consent (FPIC) are based on the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) where it is envisaged as a communal right of Indigenous communities and secured through consultation with representative institutions utilising traditional decision-making mechanisms. Woodside applies the principles of self-determination in line with UNDRIP when consulting with Traditional Custodians. While UNDRIP was drafted for State negotiations with Traditional Custodians, best practice is for companies to apply the same standards in their dealings. As such, Woodside applies Article 32 of UNDRIP which provides for consultation in good faith with the Traditional Custodians whose land and waters may be impacted through their own representative institutions. This communal approach is also consistent with the United Nations International Covenant on Economic, Social and Cultural Rights, which recognises the individual as having duties to other individuals and to the community to which they belong. Woodside is cognisant and respectful of the potential destructive impact if consultations are undertaken with groups or individuals who no longer align themselves with the recognised representative institution of the Traditional Custodian group, or representatives of Native Title Claims that have been dismissed. • Where the native title group is not clear or there is no representative institution, Woodside may seek guidance from the native title representative body or land council as to the Traditional Custodian group whose native title may overlap with the EMBA. Woodside may have reference to maps of native title claims and determinations produced by the National Native Title Tribunal, registered Indigenous Land Use Agreements, heritage databases and Indigenous Protected Areas.

•

Category	Relevant person identification methodology

	• Woodside will consult with individual Traditional Custodians where we have been directed to do so by the representative institution or the native title representative body. This may occur when for cultural reasons, and as recognised by the broader group, a person is regarded as having particular obligations in relation to a site or area that are distinct from that of the broader group.
	Assessment of relevance:
	• Where there is a positive determination or claim of native title overlapping the EMBA, the representative institution will be the Prescribed Body Corporate (also referred to as the Registered Native Title Body Corporate) for the native title group and assessed as relevant. Where a relevant land council or Native Title Representative Body provides advice that any Traditional Custodian groups are asserting Traditional Custodianship over an area of coastline adjacent to the EMBA who do not and, have never had a native title claim or determination of which land council or Native Title Representative Body are aware, Woodside will engage with the group to determine relevance.
	• Where there is an Indigenous Land Use Agreements (ILUA) whereby Aboriginal organisations or Traditional Custodian Groups have made a voluntary agreement regarding the use or management of areas of land or water overlapping the EMBA, the Prescribed Body Corporate for the native title group are assessed as relevant. Where there is more than one Traditional Custodian group that is party to an ILUA, the Traditional Custodian group whose native title claim/determination overlaps the EMBA, where applicable, is assessed as relevant.
	• In the WA context, when an Aboriginal Corporation is appointed as a Local Aboriginal Cultural Heritage Service (LACHS) under the Aboriginal Cultural Heritage Act 2021, the LACHS will be the representative institution for the group and assessed as relevant.
	• Where a Traditional Custodian group is referenced as having traditional rights and interests in a marine park management plan overlapping the EMBA, Woodside will consult the organisation or group to determine whether there is any intersect with risks and impacts from the proposed petroleum activity and assess feedback, if any, to determine relevance.
	• Where Woodside has been provided guidance from the native title representative body or land council as to the appropriate Traditional Custodian group to be consulted, Woodside will assess feedback from the group or groups, if any, to assess and determine relevance.
	• Where Woodside receives feedback from a person or organisation that identifies as a Traditional Custodian for an area overlapping the EMBA, including via an advertisement, Woodside will assess the feedback provided, and:
	  • where it is not clear whether the person(s) is a member of a Prescribed Body Corporate or native title group that Woodside has determined relevant in line with the above methodology, Woodside will engage the Prescribed Body Corporate or native title group to determine whether the person(s) is a Traditional Custodian for the area described.
	  • where the person(s) rights and interests are represented by a Prescribed Body Corporate or native title group, Woodside will apply the principles of self-determination in line with UNDRIP which recognises

•

Category	Relevant person identification methodology
	the communal right of Indigenous communities and is secured through consultation with representative institutions utilising traditional decision-making mechanisms. Woodside will engage with the individual as well as the Prescribed Body Corporate or native title group, where applicable, to determine individual or group relevance.
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: • Using 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**). 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: • Review of Woodside maps (developed based on data from the WA Local Government, Sport and Cultural Industries My Council database and WA Local Government Association (WALGA) Local Government Directory maps) to assess any overlap between the local government's defined area of responsibility and the EMBA. • Woodside hosts regular community reference/liaison group meetings. Members represent a cross-section of the community and local towns interests. Representatives are from community and industry and generally include, Woodside, State Government (for instance relevant Regional Development Commissions), Local Government, Indigenous Groups, Industry representative bodies, Community and industry organisations. Woodside considers these reference/liaison groups to be the appropriate recognised representatives of the local community for the oil and gas sector. • Woodside reviews the community reference/liaison group's terms of reference to determine its area of responsibility and 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.

•

Category	Relevant person identification methodology
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 of Woodside's existing consultation list. • Website search of registered non-government groups or organisations (i.e. registered with an Australian Business Number (ABN) and publicly available contact information) that may have public website material specific to the proposed activity at the time of development of the EP. • Organisation has a publicly available mission statement (or purpose) that clearly describes their collective functions, interests or activities. • Review of current website material to identify targeted information which demonstrates an interest with 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 a demonstrated 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**) will be assessed as relevant.
Research institutes and local conservation groups or organisations	Woodside assesses relevance for research institutes and local conservation groups or organisations using the following next steps in its methodology: • Review of Woodside's existing consultation list. • Website search for research institutes that may operate within the EMBA. This assessment is both activity and location based. • Website search for local conservation groups or organisations that regularly conduct conservation activities within the EMBA. Assessment of relevance: • Where there is known research being undertaken by a research institute within the EMBA, the research institute that is conducting the research will be assessed as relevant. • Local environmental conservation groups who regularly conduct conservation activities within the EMBA are assessed as relevant. This assessment is both activity and location based.
Additional persons	Woodside assesses relevance for additional persons using the following next steps in its methodology: • Assessment of consultation feedback provided in order to determine whether it demonstrates an overlap with potential risks and impacts specific to the proposed petroleum activity and is in accordance with the intended outcome of consultation (as set out in **Section 5.2**). • Determine whether the person or organisation should be assessed under an existing category of relevant persons(above), as appropriate, including assessment of feedback provided. • Where it is not clear which category of relevant persons an individual person(s) should be assessed under, Woodside will engage with the individual persons(s) to understand their functions, interests or activities in

•

Category	Relevant person identification methodology
	order to identify which relevant person category they should be assessed under. Assessment of relevance: • Determine which category of relevant persons the person or organisation should be assessed under. That category of relevant persons assessment of relevance will be applied. • In addition, Woodside will assess feedback provided to identify whether it demonstrates an intersect with potential risks and impacts specific to the proposed petroleum activity and is in accordance with the intended outcome of consultation (as set out in **Section 5.2**).

5.7.3 Identification of relevant persons under subregulation 11 A (1) (e)

In addition to assessing relevance under subregulation 11 A (1) (d), Woodside has discretion to categorise any other person or organisation as a relevant person under subregulation 11 A (1) (e).

In this regard, as the categorisation is at Woodside's discretion, Woodside adopts a case-by-case approach for each EP to assess relevance under subregulation 11 A (1) (e).

5.7.4 Assessment of Relevant Persons and Additional Persons for the Proposed Activity

The result of Woodside's assessment of relevant persons in accordance with Regulation 11 A (1) is outlined at **Table 5-3**.

Persons or organisations that Woodside assessed as not relevant but chose to contact at its discretion in accordance with **Section 5.3.2** are also outlined at **Table 5-3**.

•

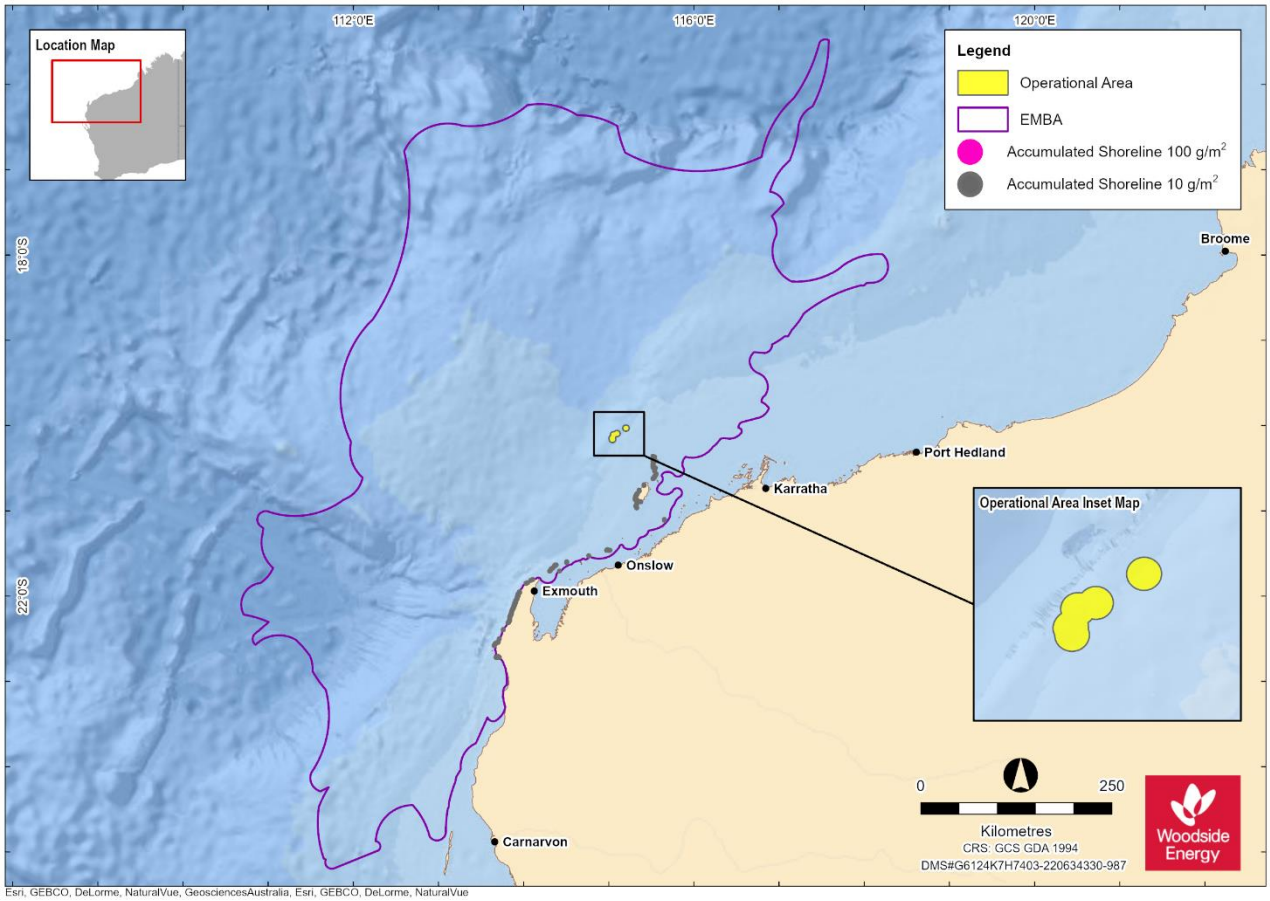


Figure 5-3: Operational Area and EMBA for this EP.

Table 5-3: Assessment of relevance

Person or Organisation	Summary of 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 Subregulation 11 A 1 (a). ABF's functions 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 Subregulation 11 A 1 (a). The Western Deepwater Trawl Fishery, North West Slope and Trawl Fishery and Western Tuna and Billfish Fishery are active in the EMBA. AFMA's functions may be relevant to the activity as the Western Deepwater Trawl Fishery, North West Slope and Trawl Fishery and Western Tuna and Billfish 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 Subregulation 11 A 1 (a). AHO's functions 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 Subregulation 11 A 1 (a). AMSA – Marine Safety's functions 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 Subregulation 11 A 1 (a). AMSA – Marine Pollution's functions 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 *(formerly DAWE)*	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 Subregulation 11 A 1 (a). The Western Deepwater Trawl Fishery, North West Slope and Trawl Fishery and Western Tuna and Billfish Fishery are active in the EMBA.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		DAFF – Fisheries functions may be relevant to the activity as the Western Deepwater Trawl Fishery, North West Slope and Trawl Fishery and Western Tuna and Billfish Fishery are active in the EMBA.	
Department of Defence (DoD)	Responsible for defending Australia and its national interests.	Woodside has applied its methodology for 'Government departments / agencies – marine' under Subregulation 11 A 1 (a). DoD's functions 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 – environment' under Subregulation 11 A 1 (b). Pilbara Trap Fishery has been active in the Operational Area and Pilbara Line Fishery may have been active in the Operational Area within the last 5 years. The 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, Land Hermit Crab Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Gascoyne Demersal Scalefish Fishery, West Coast Demersal Scalefish Fishery and Pilbara Trawl Fishery have been active in the EMBA within the last 5 years. DPIRD's functions 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 – environment' under Subregulation 11 A 1 (b). 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 – environment' under Subregulation 11 A 1 (b). There are 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 – environment' under Subregulation 11 A 1 (b). The proposed activity does not have the potential to impact Pilbara Ports Authority's functions, interests or activities as the Operational Area and EMBA do not overlap the Pilbara Ports Authority's area of responsibility.	No

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
Commonwealth and WA State Government Departments or Agencies – Environment			
Department of Agriculture, Fisheries and Forestry (DAFF) – Biosecurity (marine pests, vessels, aircraft and personnel) *(formerly DAWE)*	DAFF administers, implements and enforces the Biosecurity Act 2015. The Department requests to be consulted where an activity has the potential to transfer marine pests. DAFF also has inspection and reporting requirements to ensure that all conveyances (vessels, installations and aircraft) arriving in Australian territory comply with international health regulations and that any biosecurity risk is managed. The 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.	Woodside has applied its methodology for 'Government departments / agencies – environment' under Subregulation 11 A 1 (a). DAFF – Biosecurity's (formerly DAWE) functions may be relevant to the proposed activities in the EMBA in the prevention of introduced marine species.	Yes
Department of Climate Change, Energy, the Environment and Water (DCCEEW) *(formerly DAWE)*	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 Subregulation 11 A 1 (a). DCCEEW's (formerly DAWE) functions may be relevant to the proposed activities in the EMBA as there are potential environmental impacts from the proposed activity. There are known Maritime Cultural Heritage overlapping the EMBA.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
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 Subregulation 11 A 1 (a). DNP's functions 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 Subregulation 11 A 1 (a). The NCWHAC's functions 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 Subregulation 11 A 1 (b). The DBCA's functions 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) *(formerly DISER)*	Department of relevant Commonwealth Minister.	Required to be consulted under Regulation 11 A (1) (a).	Yes
Department of Mines, Industry Regulation and Safety (DMIRS)	Department of relevant State Minister	Required to be consulted under Regulation 11 A (1) (c).	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 subregulation 11 A 1 (d). The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
Southern Bluefin Tuna Fishery	Commonwealth commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). Although the fishery overlaps the EMBA it has not been active in the 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 subregulation 11 A 1 (d). The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years.	Yes
Western Skipjack Fishery	Commonwealth commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). Although the fishery overlaps EMBA, it has not been active in the EMBA within the last 5 years Woodside does not consider that the activity will present a risk to licence holders, given 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 subregulation 11 A 1 (d). The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years.	Yes
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 subregulation 11 A 1 (d). The Western Deepwater Trawl Fishery, North West Slope and Trawl Fishery and Western Tuna and Billfish Fishery are active in the EMBA.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		CFA's functions may be relevant to the activity as the Western Deepwater Trawl Fishery, North West Slope and Trawl Fishery and Western Tuna and Billfish Fishery are active in the EMBA.	
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 subregulation 11 A 1 (d). 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 5.3.2** 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 subregulation 11 A 1 (d). The Western Tuna and Billfish Fishery is active within the EMBA. Tuna Australia's functions may be relevant to the activity as the Western Tuna and Billfish Fishery is active in the EMBA.	Yes
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 subregulation 11 A 1 (d). 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. PPA has requested to be informed of Woodside's planned activities. Woodside chose to contact PPA at its discretion in line with **Section 5.3.2.**	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 subregulation 11 A 1 (d). Although the fishery overlaps the Operational Area, it 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

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
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 subregulation 11 A 1 (d). 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 and 3)	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). Although Area 2 of the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last 5 years. Area 2 and 3 of the fishery overlap the EMBA and have been active in the EMBA within the last 5 years.	Yes
Pilbara Crab Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). Although the fishery overlaps the Operational Area, it 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
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 subregulation 11 A 1 (d). Although the fishery overlaps the Operational Area, it 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
Specimen Shell Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). Although the fishery overlaps the Operational Area, it 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
Abalone Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d).	No

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		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 it is a dive and wade fishery with activities generally restricted to waters less than 40 m deep (DOF, 2011).	
Pearl Oyster Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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 fishing methods and location for species fished by licence holders (fishing effort is mostly focussed in shallow coastal waters of 10-15 m depth, with a maximum depth of 35 m) (Lulofs rt al. 2002).	No
Land Hermit Crab Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). The fishery does not overlap the Operational Area. The fishery overlaps the EMBA where shoreline contact is predicted and has been active in the EMBA within the last 5 years.	Yes
Onslow Prawn Managed Fishery (Area 1 and 2)	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). Area 2 of the fishery overlaps the Operational Area but has not been active in the Operational Area within the last 5 years. Area 1 and 2 of the fishery overlap the EMBA and have 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 subregulation 11 A 1 (d). Although the fishery overlaps the Operational Area, it 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
Exmouth Gulf Prawn Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d).	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		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.	
Gascoyne Demersal Scalefish Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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 Demersal Scalefish Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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
Nickol Bay Prawn Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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. Woodside chose to contact the Nickol Bay Prawn Managed Fishery at its discretion in line with **Section 5.3.2.**	No
Shark Bay Crab Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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. Woodside chose to contact the Shark Bay Crab Managed Fishery at its discretion in line with **Section 5.3.2**.	No
Shark Bay Prawn Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		Woodside chose to contact the Shark Bay Prawn Managed Fishery at its discretion in line with **Section 5.3.2**.	
Shark Bay Scallop Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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. Woodside chose to contact the Shark Bay Scallop Managed Fishery at its discretion in line with **Section 5.3.2**.	No
Developmental Octopus Interim Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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
West Coast Demersal Gillnet & Demersal Longline Interim Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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
Abrolhos Islands and Midwest Trawl Limited Entry Managed Fishery (Area 1)	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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. Woodside chose to contact the Abrolhos Islands and Midwest Trawl Limited Entry Managed Fishery (Area 1) at its discretion in line with **Section 5.3.2**.	No
Exmouth Gulf Beach Seine and Mesh Net Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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
Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). There is no publicly available information on the extent of management area for the Open Access Fishery. However, Woodside understands that the fishery has not been active in	No

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		the Operational Areas within the last 5 years. Further, Woodside has received advice from DPIRD that no contact details are available for this fishery.	
WA North Coast Shark Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). Although the fishery overlaps the Operational Area and EMBA, it has not been an active fishery since 2008/09 (DPIRD).	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 subregulation 11 A 1 (d). Although the fishery overlaps the Operational Area, it 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
Pilbara Trap Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). The fishery overlaps the Operational Area and EMBA. Catch effort 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 blocks 20140 and 20150 overlaps with the Operational Area. The fishery has been active in the 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 subregulation 11 A 1 (d). Pilbara Trap Fishery has been active in the Operational Area and Pilbara Line Fishery may have been active in the Operational Area within the last 5 years. The 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, Land Hermit Crab Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Gascoyne Demersal Scalefish Fishery, West Coast Demersal Scalefish Fishery and Pilbara Trawl Fishery have been active in the EMBA within the last 5 years.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		WAFIC's functions may be relevant to the activity as the peak representative body for State fisheries.	
Western Rock Lobster Council	Represents the interests of the Western Rock Lobster Managed Fishery.	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under subregulation 11 A 1 (d). The Western Rock Lobster Managed Fishery is active within the EMBA. The Western Rock Lobster Council's functions may be relevant to the activity as the Western Rock Lobster Managed Fishery is active in the EMBA.	Yes
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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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.	Yes
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 subregulation 11 A 1 (d). 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
West Coast Recreational Marine Users	West Coast-based dive, tourism and charter operators	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under subregulation 11 A 1 (d). Activities have the potential to impact West Coast-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

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
Karratha Recreational Marine Users	Karratha-based dive, tourism and charter operators	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under subregulation 11 A 1 (d). 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.	Yes
Recfishwest	Represents the interests of recreational fishers in WA.	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). Activities have the potential to impact game fishers' functions, interests or activities due to the location offshore and there has been recorded charter effort in the EMBA in the past 5 years.	Yes
Titleholders and Operators			
Chevron Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
Shell Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
Fugro Exploration	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Finder No 9 /10/16/17	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes
KUFPEC	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes
OMV Australia / Sapura OMV Upstream	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes
KATO Energy / KATO Corowa	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d).	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		Titleholder or Operator's permit areas overlaps the EMBA.	
JX Nippon O&G Exploration (Australia)	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes
National Energy Resource Australia (NERA) Collaborative Seismic Environment Plan Project (CSEP) acting for a consortium of operators	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under subregulation 11 A 1 (d). Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Peak Industry Representative bodies			
APPEA	Represents the interests of oil and gas explorers and producers in Australia.	Woodside has applied its methodology for 'Peak Industry Representative bodies' under subregulation 11 A 1 (d). APPEA's responsibilities are identified as having an intersect with Woodside's planned activities in the EMBA.	Yes
Traditional Custodians			
Murujuga Aboriginal Corporation (MAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). The EMBA does not overlap and is not coastally adjacent to a native title claim, determination or ILUA held by MAC. The EMBA does not overlap the Murujuga National Park. Under subregulation 11 A 1 (e), Woodside, at its discretion, chose to assess MAC as a relevant person. MAC is the approved body corporate under the Burrup and Maitland Industrial Estates Agreement (BMIEA) which underpins land access. 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. 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	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		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. Further, Woodside has applied the principles of self-determination in line with UNDRIP by ensuring we consult through Representative Aboriginal Corporations.	
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). The EMBA overlaps the Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People native title claim/determination area, which the Baiyungu, Thalanyji and Yinggarda people are party to. 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 is coastally adjacent to the EMBA. The NTGAC is responsible for the joint management of the inner Ningaloo Marine Park (State Waters), the Cape Range National Park and new conservation areas extending along the Ningaloo Coast, which runs in parallel to the outer Ningaloo Marine Park in Commonwealth waters. The NTGAC is also party to the Gnaraloo ILUA, which is coastally adjacent to the EMBA. 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' under subregulation 11 A 1 (d). The Thalanyji native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which BTAC is the Registered Native Title Body Corporate for. *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' under subregulation 11 A 1 (d). The EMBA overlaps the Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People native title claim area, which the Baiyungu, Thalanyji and Yinggarda people are party to. *YAC* and the NTGAC are the Registered Native Title Body Corporates for the Gnulli claim and YAC specifically for the Yinggarda people.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		The YAC is party to the Brickhouse and Yinggarda Aboriginal Corporation ILUA and Quobba – Yinggarda Pastoral ILUA, which are coastally adjacent to the EMBA. The Yinggarda Aboriginal Corporations nominated representative is the YMAC and the YAC executive officer and contact officer pursuant to the Corporations (Aboriginal and Torres Strait Islander) Act 2006 is employed by YMAC. Woodside has therefore consulted YAC, via YMAC.	
Kariyarra Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). 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' under subregulation 11 A 1 (d). The Yaburara & Mardudhunera People native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which WAC is the Registered Native Title Body Corporate for. WAC is party to the Cape Preston Project Deed (YM Mardie ILUA), Cape Preston West Export Facility ILUA and KM & YM ILUA, which are coastally adjacent to the EMBA.	Yes
Robe River Kuruma Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). The Robe River Kuruma Aboriginal Corporation is party to the RTIO Kuruma Marthudunera People ILUA and KM & YM ILUA, which are coastally adjacent to the EMBA.	Yes
Ngarluma Aboriginal Corporation (NAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). 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. The Ngarluma People native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which NAC is the Registered Native Title Body Corporate for.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		The RTIO Ngarluma Indigenous Land Use Agreement (Body Corporate Agreement) and Anketell Port, Infrastructure Corridor and Industrial Estates Agreement are also adjacent to the EMBA, which NAC is party to.	
Yindjibarndi Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). 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' under subregulation 11 A 1 (d). The Ngarla and Ngarla #2 (Determination Area A) native title claim does not overlap the EMBA. The claim is coastally adjacent to 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, which is coastally adjacent to the EMBA.	Yes
Malgana Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). The Malgana Part A native title claim does not overlap the EMBA. The claim is adjacent to the EMBA, which the Malgana Aboriginal Corporation is the Registered Native Title Body Corporate for. The Nanda People Part B, Malgana 2 and Malgana 3 native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which the Malgana Aboriginal Corporation and Nanda Aboriginal Corporation are the Registered Native Title Body Corporates for. The Malgana Aboriginal Corporation is party to the Malgana Woodleigh Carbla Pastoral Lease Agreement, Malgana Wooramel Pastoral Lease Agreement and Malgana Tamala Pastoral Lease Agreement, which are coastally adjacent to the EMBA.	Yes
Nanda Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). The Nanda People and Nanda #2 native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which the Nanda Aboriginal Corporation is the Registered Native Title Body Corporate for.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		The Nanda People Part B, Malgana 2 and Malgana 3 native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which the Malgana Aboriginal Corporation and Nanda Aboriginal Corporation are the Registered Native Title Body Corporates for.	
Bundi Yamatji Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). The Yamatji Nation native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which the Bundi Yamatji Aboriginal Corporation is the Registered Native Title Body Corporate for. The Bundi Yamatji Aboriginal Corporation is also party to the Yamatji Nation Agreement, which is coastally adjacent to the EMBA.	Yes
Yamatji Marlpa Aboriginal Corporation (YMAC)	Native Title Representative Body	Woodside has applied its methodology for 'Traditional Custodians' under subregulation 11 A 1 (d). 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 rights and interests of an Indigenous Community but exist to assist native title claimants and holders. YMAC is identified in Commonwealth and State Marine Park Management Plans which overlap the EMBA as the Native Title Representative Body (see **Table 4-19**). The NTGAC and YAC's nominated representative is 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. 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 as the NTGAC and YAC's nominated representative.	Yes
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 subregulation 11 A 1 (d).	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		There are known shipwrecks overlapping the EMBA which the Western Australian Museum may be responsible for.	
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 subregulation 11 A 1 (d). 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 subregulation 11 A 1 (d). The Shire of Ashburton's area of responsibility overlaps the EMBA.	Yes
City of Karratha	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Baynton, Baynton West, Bulgarra, Cossack, Dampier, Gap Ridge, Karratha, Karratha Industrial Estate, Jingarri, Madigan, Millars Well, Nickol, Pegs Creek, Point Samson, Roebourne, Whim Creek and Wickham.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under subregulation 11 A 1 (d). The City of Karratha's area of responsibility overlaps the EMBA.	Yes
Shire of Carnarvon	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Babbage Island, Brockman, Browns Range, Carnarvon, Coral Bay, East Carnarvon, Greys Plain, Ingaarda, Kingsford, Morgantown, North Plantations, South Carnarvon, South Plantations.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under subregulation 11 A 1 (d). The Shire of Carnarvon's area of responsibility overlaps the EMBA.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
Exmouth Liaison Reference Group (CRG) • Base Marine • Bgahwan Marine • Cape Conservation Group Inc. • DBCA • Department of Defence • Department of Transport • Exmouth Bus Charter • Exmouth Chamber of Commerce and Industry • Exmouth District High School • Exmouth Freight and Logistics • Exmouth Game Fishing Club • Exmouth Tackle and Camping Supplies • Exmouth Visitors Centre • Exmouth Volunteer Marine Rescue • Fat Marine • Gascoyne Development Commission • Gun Marine Services • Ningaloo Lodge • Offshore Unlimited • Shire of Exmouth • BHP Petroleum • Santos • Community Member	The Exmouth CRG 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 subregulation 11 A 1 (d). The Exmouth CRG's area of responsibility under its terms of reference overlaps the EMBA.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
Karratha Community Liaison Group • 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.*	The KLG 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 subregulation 11 A 1 (d). The KLG's area of responsibility under its terms of reference does not overlap the EMBA. Under subregulation 11 A 1 (e),.Woodside, at its discretion, chose to assess the KLG as a relevant person.	Yes

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
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 subregulation 11 A 1 (d). The Onslow Chamber of Commerce and Industry's interests have the potential to be impacted by the proposed activities.	Yes
Carnarvon 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 Carnarvon and surrounding areas.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under subregulation 11 A 1 (d). The Carnarvon Chamber of Commerce and Industry's interests have the potential to be impacted by the proposed activities.	Yes
Other non-government groups or organisations			
350 Australia (350A)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under subregulation 11 A 1 (d) 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**). Woodside chose to contact 350A at its discretion in line with **Section 5.3.2**.	No
Australian Conservation Foundation (ACF)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under subregulation 11 A 1 (d) 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**). Woodside chose to contact ACF at its discretion in line with **Section 5.3.2**.	No
Australian Marine Conservation Society (AMCS)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under subregulation 11 A 1 (d) to determine AMCS's relevance for the proposed activity.	No

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
		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**). Woodside chose to contact AMCS at its discretion in line with **Section 5.3.2**.	
Conservation Council of Western Australia (CCWA)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under subregulation 11 A 1 (d) 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**). Woodside chose to contact CCWA at its discretion in line with **Section 5.3.2**.	No
Greenpeace Australia Pacific (GAP)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under subregulation 11 A 1 (d) 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**). Woodside chose to contact GAP at its discretion in line with **Section 5.3.2**.	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 subregulation 11 A 1 (d) 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 subregulation 11 A 1 (d) 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

Person or Organisation	Summary of functions, interests or activities	Assessment of relevance	Relevant person
University of Western Australia (UWA)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under subregulation 11 A 1 (d) 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 5.3.2**.	No
Western Australian Marine Science Institution (WAMSI)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under subregulation 11 A 1 (d) to determine WAMSI's relevance for the proposed activity. There is no known research being undertaken by WAMSI that intersects within the EMBA. Woodside chose to contact WAMSI at its discretion in line with **Section 5.3.2**.	No
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under subregulation 11 A 1 (d) 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 5.3.2**.	No
Australian Institute of Marine Science (AIMS)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under subregulation 11 A 1 (d) 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 5.3.2**.	No

5.8 Consultation activities and additional engagement

5.8.1 Julimar Appraisal Drilling and Surveys EP Consultation

The following is a summary of additional consultation undertaken for this EP:

- A Consultation Information Sheet was provided to relevant persons and persons Woodside chose to contact, which included details such as an activity overview, maps, information regarding the EMBAs for this EP, and a summary of key risks and/or impacts and management measures (**Appendix F, reference 1.17**).
- An activity update Consultation Information Sheet was provided to relevant persons and persons Woodside chose to contact, which included an update regarding planned activities, information regarding the EMBAs for this EP and additional information relating to mitigation and managements measures for this EP (**Appendix F, reference 3.1**).
- Since the commencement of the initial consultation period (August 2022), the Consultation Information Sheet has also been available on Woodside's website and the activity update Consultation Information Sheet has been available on the Woodside website since February 2023. The Information Sheets include a toll-free 1800 phone number and Woodside's feedback email address (feedback@woodside.com.au).
- A bespoke targeted Consultation Information Sheet was provided to relevant Traditional Custodian groups (**Appendix F, reference 3.2**) and phone calls to provide context to the consultation made.
- Additional targeted information was provided to relevant marine users including Commonwealth and State fisheries, fishery representative bodies, AHO and AMSA – Marine Safety. 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 30-day 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**).
- Woodside hosted community reference group information sessions with the Karratha Community Reference Group and Exmouth Community Liaison Group, where updates on the proposed activity were provided.
- Woodside advertised the planned activities proposed for this EP in a national, state and relevant local newspapers (The Australian, The West Australian, Pilbara News, North West Telegraph and Mid West Times on 15 February 2023 and the Geraldton Guardian on 17 February 2023 (see **Appendix F, reference 3.3**). No comments or feedback were received from the advertisements.
- Consultation activities undertaken with relevant persons are summarised at **Table 5-4**.

- Engagement undertaken with persons or organisations Woodside assessed as not relevant but chose to contact (see **Section 5.3.2**) are also summarised at **Table 5-4**.

5.8.2 Responding to Regulatory and Other Feedback

A significant feature of the consultation for this EP is that, since the EP was first submitted, consultation requirements have changed and therefore the consultation methodology undertaken for this EP has transformed. Some of this has occurred because Woodside's understanding of relevant persons continues to mature through updates to its known Consultation List, through experience and as a result of feedback. Other aspects have changed as a result of discussions, requirements and recommendations made during the regulatory process of submitting and assessing this EP. Further aspects have changed as a direct result of judicial views on consultation, especially those provided in the recent Federal Court decision of *Santos NA Barossa Pty Ltd v Tipakalippa* [2022] FCAFC 193.

This adaptive methodology includes placing advertisements in a local, state and national newspaper (**Appendix F, reference 3.3**) to enable persons or organisations whose functions, interests or activities may be impacted by the proposed activity to be aware of Woodside's consultation for its EPs and provide feedback in accordance with the intended outcome of consultation (as set out in **Section 5.2**).

Consultation activities undertaken with relevant persons are summarised at **Table 5-4**.

Engagement undertaken with persons or organisations Woodside assessed as not relevant but chose to contact (see **Section 5.3.2**) are summarised at **Table 5-4**.

Table 5-4: Summary of consultation activities

Each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant.		
Commonwealth and WA State Government Departments or Agencies – Marine		
Australian Border Force (ABF)		
Summary of consultation provided and responses: On 16 August 2022, Woodside emailed ABF, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet. On 6 September 2022, Woodside emailed ABF, following up on the proposed activity (Appendix F, reference 2.1), and provided a Consultation Information Sheet. On 15 February 2023, Woodside emailed ABF providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet. On 7 March 2023, Woodside emailed the ABF following up on the proposed activity (Appendix F, reference 4.3) 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**	**Environment Plan Controls**
No feedback, objections or claims received despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has addressed maritime security-related issues in **Section 6** of this EP based on previous offshore activities. Woodside considers the measures and controls in the EP address ABF's functions, interests or activities. No additional EP controls are required.
Australian Fisheries Management Authority (AFMA)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed AFMA, advising of the proposed activity (Appendix F, reference 1.2) and provided a Consultation Information Sheet and fisheries map. • On 6 September 2022, Woodside emailed AFMA, following up on the proposed activity (Appendix F, reference 2.2), and provided a Consultation Information Sheet and fisheries map. • On 16 September 2022, AFMA responded, thanking Woodside for its opportunity to comment and confirmed the fisheries Woodside identified were correct; and advised Woodside to consider the North West Slope Trawl Fishery in its list of fisheries to consult. • On 28 September 2022, Woodside responded, thanking AFMA for its email and noted its appreciation for AFMA's confirmation of Woodside's list of relevant fisheries; • Confirmed that it has consulted fisheries either directly or via their respective representative organisations;		

- Detailed that it had reviewed the fishery overlap with the Operational Area and determined that the North West Slope Trawl Fishery management area does not overlap the Operational Area; and
- Confirmed that that while there is no overlap between the North West Slope Trawl Fishery and the Operational Area, both the Commonwealth Fisheries Association and Western Australian Fishing Industry Council, whom represent the North West Slope Trawl Fishery, have been consulted with regard to the proposed activity.
- Woodside also provided AFMA with a map of the Operational Area indicating where there is no overlap with the North West Slope Trawl Fishery and the Operational Area.

- On 15 February 2023, Woodside emailed AFMA providing additional information on the proposed activity (**Appendix F, reference 3.4**), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed the AFMA following up on the proposed activity (**Appendix F, reference 4.3**) 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	Environment Plan Controls
AFMA has requested Woodside consult with operators who have entitlements to fish within the proposed area and advised Woodside to consider the North West Slope Trawl Fishery in its list of fisheries to consult. No objections or claims have been received about activity impacts or risks.	Woodside has addressed AFMA's request to review an additional Commonwealth fishery. Woodside has confirmed the North West Slope Trawl Fishery management area does not overlap the Operational Area. Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.6**).	Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.2** of this EP. Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** 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)

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed the AHO, advising of the proposed activity (Appendix F, reference 1.3) and provided a Consultation Information Sheet and shipping lanes map.
- On 17 August 2022, the AHO responded acknowledging receipt of Woodside's email.

- On 15 February 2023, Woodside emailed AHO providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet
- On 7 March 2023, Woodside emailed the AHO following up on the proposed activity (Appendix F, reference 4.2) and provided a shipping lanes map.
- On 8 March 2023, AHO responded, acknowledging receipt of Woodside's email.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	AHO responded and acknowledged receipt of Woodside's consultation email. 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 7.6**).	Woodside will notify the AHO no less than four working weeks before operations commence, as referenced as a **PS 4.3** in this EP. Woodside considers the measures and controls in the EP address AHO's functions, interests or activities. No additional EP controls are required.

Australian Maritime Safety Authority (AMSA) - Marine Safety

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed the AMSA, advising of the proposed activity (Appendix F, reference 1.3) and provided a Consultation Information Sheet and shipping lanes map.
- On 30 August 2022, AMSA responded thanking Woodside for the information provided and:
  - provided a vessel traffic plot for the well activities offshore Dampier, NW WA;
  - advised that some heavy vessel traffic does pass through the top of permit block WA-49-L;
  - requested that AMSA's Joint Rescue Coordination Centre (JRCC) be notified at least 24–48 hours before operations commence;
  - requested that the AHO be contacted no less than four working weeks before operations commence for the promulgation of related notices to mariners;
  - requested that all vessels exhibit appropriate lights and shapes to reflect the nature of operations; and
  - requested that all vessels comply with the International Rule for Preventing Collisions at Sea.

- On 30 August 2022, Woodside responded and thanked AMSA for its feedback and confirmed we will contact/notify:
  - the AHO no less than 4 weeks before operations commence;
  - AMSA's JRCC at least 24-48 hours before operations commence; and
  - provide updates to both the AHO and AMSA on any changes.

- 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.

- On 15 February 2023, Woodside emailed AMSA providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet.
- On 16 February 2023, AMSA messaged/called Woodside requesting the digital data.
- On 17 February 2023, Woodside responded to AMSA and provided a shapefile containing the operational areas of the project / EP.
- On 22 February 2023, AMSA responded, providing two vessel traffic plots indicating areas where heavy vessel traffic will be encountered and requested.
  - associated working vessels and large support vessels notify AMSA's Rescue Centre (ARC) through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings 24-48 hours before operations commence
  - vessel details (including name, callsign and Maritime Mobile Service Identity (MMSI)), as you have provided below, satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start and end
- On 7 March 2023, Woodside responded thanking AMSA for its feedback and confirmed we will:
  - notify the AHO no less than 4 weeks before operations commence;
  - notify AMSA's JRCC at least 24-48 hours before operations commence;
  - notify AMSA's JRCC when operations end; and
  - provide updates to both the AHO and AMSA on any material changes to planned activities.
  - Woodside also provided shipping lane figures and associated Operational Areas along with figures showing the Environment that May Be Affected (EMBA).

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
AMSA has provided feedback and requested that: • AMSA's Joint Rescue Coordination Centre (JRCC) be notified at least 24–48 hours before operations commence; • the AHO be contacted no less than four working weeks before operations commence for the promulgation of related notices to mariners; • all vessels exhibit appropriate lights and shapes to reflect the nature of operations; and	Woodside has addressed AMSA's requests and provided further information on the proposed activity (**Appendix F, reference 3.4**), including a Consultation Information Sheet. 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 7.6**).	Woodside will notify AMSA's JRCC at least 24–48 hours before operations commence for each survey, as referenced as **PS 4.5** in this EP. Woodside will notify the AHO no less than four working weeks before operations commence, as referenced as a **PS 4.3** in this EP. Woodside considers the measures and controls in the EP address AMSA – Marine Safety's functions, interests or activities. No additional EP controls are required.

• all vessels comply with the International Rule for Preventing Collisions at Sea. No objections or claims have been received about activity impacts or risks.		
Australian Maritime Safety Authority (AMSA) – Marine Pollution		
Summary of consultation provided and responses: • On 20 September 2022, Woodside emailed AMSA, (Appendix F, reference 1.4) and provided a copy of the Oil Pollution First Strike Plan (Appendix F, reference 1.4). • On 15 February 2023, Woodside emailed AMSA providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed AMSA following up on the proposed activity (Appendix F, reference 4.3) 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**	**Environment Plan Controls**
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 has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside and has addressed oil pollution planning and response **Appendix D.** Woodside considers the measures and controls in the EP address AMSA – Marine Pollution's functions, interests or activities. No additional EP controls are required.
Department of Defence (DoD)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed DoD, advising of the proposed activity (Appendix F, reference 1.6) and provided a Consultation Information Sheet and defence map. • On 6 September 2022, Woodside emailed DoD, following up on the proposed activity (Appendix F, reference 2.4), and provided a Consultation Information Sheet and defence map. • On 19 September 2022, DoD responded, advising that:		

- part of the proposed operational area is located within the North West Exercise Area (NWXA) and restricted airspace;
- unexploded ordnance (UXO) may be present on and in the sea floor within the NWXA;
- Woodside must, therefore, inform itself as to the risks associated with conducting activities in the area (for example, the detonation of UXO);
- all activities in the area are conducted at its own risk; and
- the Commonwealth of Australia takes no responsibility for reporting the location and type of UXO that may be in the areas, identifying or removing any UXO from these areas and any loss or damage suffered or incurred arising out of, or directly related to, UXO in the area.

And DoD requested:

- a minimum of five weeks notification prior to the commencement of activities;
- Woodside to liaise with Airservices Australia regarding any notification requirements in restricted airspace; and
- Woodside to notify the AHO of the activities three weeks prior to commencement.

- On 19 September 2022, Woodside responded:
  - thanking DoD for its feedback;
  - noted its advice regarding the Operational Area and the presence of the North West Exercise Area (NWXA) and restricted airspace; and
  - noted its advice with respect to the location, identification, removal, or damage to equipment from unexploded ordinances (UXOs).

  And Woodside:

  - confirmed it will notify DoD at least five weeks prior to the commencement of activities;
  - noted the requirement and contact details provided by the DoD to engage with Airservices Australia if the restricted airspace is activated;
  - advised that Woodside would confirm restricted air space status with the DoD as part of its commencement of activity notification; and
  - advised that AHO has already been engaged for this activity and is included in Woodside's activity notification protocols. At its request, AHO will be notified four weeks prior to the start of activities.
- On 15 February 2023, Woodside emailed DOD providing additional information on the proposed activity (Appendix F, reference 3.5), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed DOD following up on the proposed activity (Appendix F, reference 4.4) and to request any feedback.
- On 16 March 2023, DoD responded, advising that:
  - all activities in the area are conducted at its own risk; and

○ the Commonwealth of Australia, represented by the Department of Defence, takes no responsibility for: i. reporting the location and type of UXO that may be in the areas; ii. identifying or removing any UXO from these areas; and iii. any loss or damage suffered or incurred by Woodside or any third party arising out of, or directly related to, UXO in the area. DoD also advised that: i. It requires a minimum of five weeks notification prior to the commencement of activities. ii. any activities undertaken within Restricted Airspace comply with the relevant Notice to Air Mission (NOTAM) restrictions continued liaison with the Australian Hydrographic Service (AHS) for Notices to Mariners (NOTMAR), in particular ensure that the AHS is notified three weeks prior to the actual commencement of activities. • On 30 March 2023, Woodside responded thanking the DoD for its feedback and: ○ noted DoD's advice on the location of the Operational Area for the proposed activities and the presence of the North West Exercise Area (NWXA) and restricted airspace. ○ note its advice with respect to the location, identification, removal, or damage to equipment from unexploded ordinances (UXOs). And confirmed Woodside will: ○ notify the Department of Defence at least five weeks prior to the commencement of activities. ○ confirm restricted air space status with the Department of Defence as part of its commencement of activity notification. ○ and the AHO will be notified four weeks prior to the start of activities in line with its request.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**

DOD has provided feedback and requested: • a minimum of five weeks notification prior to the commencement of activities; • Woodside to liaise with Airservices Australia regarding any notification requirements in restricted airspace; and • Woodside to notify the AHO of the activities three weeks prior to commencement. No objections or claims have been received about activity impacts or risks.	Woodside has addressed DoDs feedback, including: • providing DoD activity notification five weeks prior to commencement (**P.S 4.8)** and AHO four weeks prior to commencement (**P.S 4.3)** of activities; • noted the requirement and contact details provided by DoD to engage with Airservices Australia if the restricted airspace is activated; and • advised that Woodside will confirm restricted air space status with DoD as part of the commencement of activity notification. 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 7.6**).	Woodside has addressed DoDs expectations on notifications – Defence restricted air space and AHO (**PS 4.8** and **PS 4.3**). AHO have been consulted on the activity and are included in Woodside's activity notification protocols. AHO will be notified four weeks prior to the start of activities. Woodside considers the measures and controls in the EP address DoD's functions, interests or activities. No additional EP controls are required.
Department of Primary Industries and Regional Development (DPIRD)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed DPIRD, advising of the proposed activity (Appendix F, reference 1.8) and provided a Consultation Information Sheet and fisheries map. • On 6 September 2022, Woodside emailed DPIRD, following up on the proposed activity (Appendix F, reference 2.6), and provided a Consultation Information Sheet and fisheries map. • On 15 February 2023, Woodside emailed DPIRD following provided additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed the DPRID following up on the proposed activity (Appendix F, reference 4.3) 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	Environment Plan Controls
No feedback, objections or claims received despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address DPIRD's functions, interests or activities. No additional EP controls are required.
Department of Transport (DoT)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed DoT, advising of the proposed activity (**Appendix F, reference 1.1**) and provided a Consultation Information Sheet. • On 1 September 2022, DoT responded to Woodside's email and asked to be consulted if there is a risk of a spill impacting State waters. • On 2 September 2022, Woodside responded, thanking DoT for its email and confirmed DoT will be consulted if there is a risk of a spill impacting State waters. • On 20 September 2022, Woodside emailed DoT (**Appendix F, reference 1.9**) and provided a copy of the Oil Pollution First Strike Plan (**Appendix D**). • On 15 February 2023, Woodside emailed DoT providing additional information on the proposed activity (**Appendix F, reference 3.5**), and provided an updated Consultation Information Sheet • On 21 February 2023, DoT responded and asked to be consulted if there any changes that may result in an increased risk of a spill impacting State waters from the proposed activities. • On 31 March 2023, Woodside responded confirming that if there is a risk of a spill impacting State waters, the Department of Transport will be consulted.		

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
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. No objections or claims have been received about activity impacts or risks.	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 7.6**).	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 considers the measures and controls in the EP address DOT's functions, interests or activities. No additional EP controls are required.
Department of Planning, Lands and Heritage (DPLH)		
Summary of consultation provided and responses: • On 15 February 2023, Woodside emailed DPLH advising of the proposed activity (Appendix F, reference 3.6), and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed the DPLH following up on the proposed activity (Appendix F, reference 4.5) and requested any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**

No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see Section 5.2). 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 7.6).	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 4.9.2**). While impacts to underwater heritage sites or shipwrecks are possible in the event of an unplanned hydrocarbon spill, Woodside considers it adopts appropriate controls to prevent a hydrocarbon spill and controls to respond in the highly unlikely event of a hydrocarbon spill, as demonstrated in **Section 6.8.2** and **Section 6.8.3.** Woodside considers the measures and controls in the EP address DPLH's functions, interests or activities. No additional EP controls are required.
Commonwealth and WA State Government Departments or Agencies – Environment		
Department of Climate Change, Energy Efficiency and Water (DCCEEW) /Department of Agriculture, Fisheries and Forestry (DAFF) – Fisheries and Biosecurity (marine pests, vessels, aircraft and personnel) *(formerly DAWE)*		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed DCCEEW/DAFF, advising of the proposed activity including biosecurity matters (Appendix F, reference 1.5) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed DCCEEW/DAFF, following up on the proposed activity (Appendix F, reference 2.3), and provided a Consultation Information Sheet. • On 15 February 2023, Woodside emailed DCCEEW/DAFF providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet.		

• On 7 March 2023, Woodside emailed the DCCEW/DAFF following up on the proposed activity (Appendix F, reference 4.3) and requested any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, 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 7.6**).	The Environment Plan 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 4.8**). 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 **Section 6.8.2** and **Section 6.8.3.** 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 4.9.2**). While impacts to underwater heritage sites or shipwrecks are possible in the event of an unplanned hydrocarbon spill, Woodside considers it adopts appropriate controls to prevent a hydrocarbon spill and controls to respond in the highly unlikely event of a hydrocarbon spill, as demonstrated in **Section 6.8.2** and **Section 6.8.3.**

		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 6.8.9**). Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address DCCEEW and DAFF's functions, interests or activities. No additional EP controls are required.
Director of National Parks (DNP)		

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed DNP, advising of the proposed activity (Appendix F, reference 1.7), and provided a Consultation Information Sheet.
- On 6 September 2022, Woodside emailed DNP, following up on the proposed activity (Appendix F, reference 2.5), and provided a Consultation Information Sheet.
- On 15 February 2023, Woodside emailed DNP providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed the DNP following up on the proposed activity (Appendix F, reference 4.3) and requested any feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	The Environment Plan 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 4.8**). 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 **Section 6.8.2** and **Section 6.8.3.** This EP demonstrates how Woodside will identify and managed 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 (**Section 6.9**).

		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)		
Summary of consultation provided and responses: • On 15 February 2023, Woodside emailed NCWHAC advising of the proposed activity (Appendix F, reference 3.7), and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed the NCWHAC following up on the proposed activity (Appendix F, reference 4.6) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside notes the consultation information was provided to the NCWHAC. No feedback was received on the proposed activities directly from NCWHAC despite follow up or via NOPSEMA. 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 7.6**).	The Environment Plan demonstrates that the proposed activities are outside the boundaries of the Ningaloo Marine Park and identifies that there are no credible impacts to the values of the Ningaloo Marine Park (**Section 4.8**). 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 **Section 6.8.2** and **Section 6.8.3.**

		Woodside considers the measures and controls in the EP address NCWHAC's functions, interests or activities. No additional EP controls are required.

Department of Biodiversity, Conservation and Attractions (DBCA)

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed DBCA, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.
- On 25 August 2022, DBCA responded acknowledging receipt of Woodside's email and provided no additional comments.
- On 26 August 2022, Woodside responded, acknowledging DBCA's email.
- On 15 February 2023, Woodside emailed DBCA providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet.
- On 24 February 2023, DBCA responded with several points:
    - Baseline values and state of the potentially affected environment of ecologically important areas should be appropriately understood and documented prior to any operations commencing that have the potential to lead to hydrocarbon releases.
    - Woodside should establish appropriate baseline survey data on the current state of areas supporting important ecological values and any current contamination if present within the area of potential impact of hydrocarbon releases.
    - DBCA encourages Woodside to acquire the necessary information to implement a Before-After, Control-Impact (BACI) framework in planning and evaluating its management response. This may include independently monitoring and collecting data where required or identifying other data sources.
    - DBCA also provided an 'Incidents and Emergency Response' in case of a hydrocarbon release.
- On 13 March 2023, Woodside responded, thanking DBCA for providing feedback and confirming that an overview of their comments and response will be included in respective EPs following acceptance of the EPs by NOPSEMA. Woodside also advised DBCA:
    - Areas of ecological importance in the proximity of the Environment Plan Operational Areas will not be impacted by planned activities.
    - Woodside's oil spill scientific monitoring program (SMP) will provide for a quantitative assessment of the overall environmental impacts in the event of an unplanned hydrocarbon release or any release event with the potential to contact sensitive environmental receptors.

○ Woodside informed DBCA of its National Light Pollution Guidelines. ○ Woodside provided information on its Incidents and Emergency Response. ○ Woodside notes that DBCA will not implement an oiled wildlife management response on behalf of a petroleum operator.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
DBCA provided feedback relating to: • documentation of areas potentially affected by any operations commencing that have the potential to lead to hydrocarbon releases • requesting Woodside to establish appropriate baseline survey data on the current state of areas • DBCA encourages Woodside to acquire the necessary information to implement a Before-After, Control-Impact (BACI) framework • DBCA also provided an 'Incidents and Emergency Response' in case of a hydrocarbon release No objections or claims have been received about activity impacts or risks.	Woodside has addressed the DBCA's feedback, including: • Areas of ecological importance in the proximity of the Environment Plan Operational Areas will be not impacted by planned activities. • Woodside's oil spill scientific monitoring program (SMP) will provide for a quantitative assessment of the overall environmental impacts in the event of an unplanned hydrocarbon release, or any release event with the potential to contact sensitive. Woodside considers the measures and controls in the EP address DBCA's functions, interests or activities. 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 7.6**).	The Environment Plan demonstrates that the proposed activities are outside the boundaries of a proclaimed State Marine Park and identifies that there are no credible impacts to the values of any State Marine Parks as a result of planned activities (**Section 4.8**). 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 **Section 6.8.2** and **Section 6.8.3.** Woodside considers the measures and controls in the EP address DBCA's functions, interests or activities. No additional EP controls are required.
Commonwealth and State Government Departments or Agencies – Industry		
Department of Industry, Science and Resources (DISR) *(formerly DISER)*		

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed DISR, advising of the proposed activity (**Appendix F, reference 1.1**) and provided a Consultation Information Sheet.
- On 6 September 2022, Woodside emailed DISR, following up on the proposed activity (**Appendix F, reference 2.1**), and provided a Consultation Information Sheet.
- On 15 February 2023, Woodside emailed DISR providing additional information on the proposed activity (**Appendix F, reference 3.4**), and provided an updated Consultation Information Sheet
- On 7 March 2023, Woodside emailed the DISR following up on the proposed activity (**Appendix F, reference 4.3**) 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	Environment Plan Controls
No feedback received despite follow up and no objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address DISR's functions, interests or activities. No additional EP controls are required.

Department of Mines, Industry Regulation and Safety (DMIRS)

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed DMIRS, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.
- On 6 September 2022, Woodside emailed DMIRS, following up on the proposed activity (Appendix F, reference 2.1), and provided a Consultation Information Sheet.
- On 15 September 2022, DMIRS responded to Woodside, confirming it does not require any further information and requested notifications for both the start and conclusion of activities.
- On 19 September 2022, Woodside responded to DMIRS, thanking it for its email and confirmed notifications will be sent to inform DMIRS of the start and finish dates of activities.
- On 15 February 2023, Woodside emailed DMIRS providing additional information on the proposed activity (Appendix F, reference 3.4), and provided an updated Consultation Information Sheet.

• On 7 March 2023, Woodside emailed the DMIRS following up on the proposed activity (Appendix F, reference 4.3) and requested any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
DMIRS requested notifications for both the start and conclusion of activities. No objections or claims have been received about activity impacts or risks.	Woodside has addressed DMRIS feedback including confirming that it will provide notifications to DMIRS prior to the commencement and at the end of the activity, as referenced at **Section 7.8.2.2** this EP. Woodside considers the measures and controls in the EP address DMIRS's functions, interests or activities. 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 7.6**).	Woodside will provide notifications to DMIRS prior to the commencement and at the end of the activity, as referenced at **Section 7.8.2.2** this EP. Woodside considers the measures and controls in the EP address DMIRS's functions, interests or activities. No additional EP controls are required.
Commonwealth Commercial fisheries and representative bodies		
North West Slope and Trawl Fishery		
Summary of consultation provided and responses: • On 15 February 2023, Woodside emailed North West Slope and Trawl Fishery advising of the proposed activity (Appendix F, reference 3.8), and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed the North West Slope and Trawl Fishery following up on the proposed activity (Appendix F, reference 4.7) 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**	**Environment Plan Controls**

No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.6**).	Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Western Deepwater Trawl Fishery		
Summary of consultation provided and responses: • On 15 February 2023, Woodside emailed Mackerel Managed Fishery (Area 2) advising of the proposed activity (Appendix F, reference 3.8), and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed Mackerel Managed Fishery (Area 2) following up on the proposed activity (Appendix F, reference 4.8) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, WAFIC and individual relevant licence holders.	Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.3** of this EP.

	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 7.6**).	Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Western Tuna and Billfish Fishery		
Summary of consultation provided and responses: • On 15 February 2023, Woodside emailed Western Tuna and Billfish Fishery advising of the proposed activity (Appendix F, reference 3.47), and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed Western Tuna and Billfish Fishery following up on the proposed activity (Appendix F, reference 4.23) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, 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 further feedback be received, it will be assessed and, where	Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and

	appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.6**).	Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Commonwealth Fisheries Association (CFA)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed CFA, advising of the proposed activity (Appendix F, reference 1.14) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed CFA, following up on the proposed activity (Appendix F, reference 2.12), and provided a Consultation Information Sheet. • On 15 February 2023, Woodside emailed CFA providing additional information on proposed activity (Appendix F, reference 3.9), and provided an updated Consultation Information Sheet. • On 15 February 2023, CFA responded thanking Woodside for its email and advised that CFA is not resourced to give feedback and Woodside will need to direct enquiries directly to the associations that represent the directly affected fisheries/fishers. • On 17 March 2023, Woodside responded thanking CFA for its email and confirmed that Woodside has provided consultation information directly to licence holders it has assessed as 'relevant persons' for the above proposed EPs as well as their fishery representative bodies.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
CFA responded and advised that CFA is not resourced to give feedback and asked Woodside to direct enquiries directly to the associations that represent the directly affected fisheries/fishers.	Woodside has addressed the CFA's feedback, including confirming it has provided consultation information directly to licence holders it has assessed as 'relevant persons' for the proposed EP as well as their fishery representative bodies. Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, WAFIC and individual relevant licence holders. Woodside engages in	Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly

No objections or claims have been received about activity impacts or risks despite follow up.	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 7.6**).	impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address CFA's functions, interests or activities. No additional EP controls are required.
Australian Southern Bluefin Tuna Industry Association (ASBTIA)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed ASBTIA, advising of the proposed activity (Appendix F, reference 1.14) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed ASBTIA, following up on the proposed activity (Appendix F, reference 2.12), and provided a Consultation Information Sheet. • On 15 February 2023, Woodside emailed ASBTIA providing additional information on the proposed activity (Appendix F, reference 3.11), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed ASBTIA following up on the proposed activity (Appendix F, reference 4.24) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.6**).	Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the

		commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the ASBTIA's functions, interests or activities. No additional EP controls are required.
Tuna Australia		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed Tuna Australia, advising of the proposed activity (Appendix F, reference 1.14) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed Tuna Australia, following up on the proposed activity (Appendix F, reference 2.12), and provided a Consultation Information Sheet. • On 13 March 2023, Woodside emailed Tuna Australia providing additional information on the proposed activity (Appendix F, reference 4.36), and provided an updated Consultation Information Sheet • On 15 March 2023, Tuna Australia responded, providing Woodside their position statement for engaging with energy companies seeking consultation advice from stakeholders on environmental plans and project proposals. o An overview of Tuna Australia's functions, interests and activities as well as the organisation's company objectives. o The geographic areas that Tuna Australia represents by membership Statutory Fishing Rights o A recommendation that project proponents also engage with the Australian Southern Bluefin Tuna Industry Association for any proposals in the Southern Bluefin Tuna fishing area. o The position that Tuna Australia considers itself a 'relevant person' consistent with NOPSEMA guidelines. o A request that Tuna Australia be contacted when any proposed activity has the potential to impact vessel navigation, fishing activities, and/or the conservation of fish resources consistent with the Offshore Petroleum and Greenhouse Gas Storage Act 2006. o A request for a map from proponents of the proposed activity to determine if its member interests may be affected on a case-by-case basis. o A request that where potential effects exist, there is a need for a service agreement. Tuna Australia advised it can no longer coordinate consultation with offshore energy activities on behalf of our members without a service agreement in place. Tuna Australia requests proponents execute our services agreement and provide information in a written succinct manner including estimated boundaries for extent of planned activity impacts (i.e. artificial light, noise, discharges etc) as well as activities within the operational area. This advice will be distributed to members and non-members holding SFRs in the Eastern (114 concession holders) and Western (61 concession holders) Tuna and Billfish Fisheries for comment. Information provided would be relevant to tuna and billfish fisheries in the area that may affect vessel navigation, fishing activities, and/or the conservation of fish resources based on the planned aspects of the activity, and proposed control measures to manage impacts.		

○ Tuna Australia noted that it wishes to engage constructively with project proponents for all situations where there is potential for conflict with vessel navigation, access to fishing area and/or gear, and the biology of target fish and baitfish. Advice provided can change annually due to the dynamic nature of our fisheries. ○ Tuna Australia encouraged companies requiring advice from our sector to enter into a consultation services agreement with Tuna Australia to support their applications. Noting that Tuna Australia may be able to provide information on vessel navigation, fishing activities and/or the conservation of fish resources that may be affected that is not publicly available and will be an important input to environmental impact and risk assessment processes.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
Tuna Australia responded, providing Woodside their position statement for engaging with energy companies seeking consultation advice from stakeholders on environmental plans and project proposals. The position statement requests that where there is the potential for the proposed activity to impact Tuna Australia's functions, interests or activities or that of its members, there is a need for a service agreement to be executed. No objections or claims have been received about activity impacts or risks despite follow up.	The fishery management area for the Western Tuna and Billfish Fishery, which Tuna Australia represents, overlaps both the Operational Area and EMBA. However, there is considered to be no potential for interaction within these areas as: •No recent fishing effort has occurred within or nearby to the Operational Area. •Fishery Status Report 2022 indicates current fishing effort is concentrated between Carnarvon and Albany and occurred within the EMBA in the last five years (2016–2021) (Patterson et al., 2022). Woodside acknowledges previous feedback received from Tuna Australia with respect to separate EPs. Woodside confirms that it conducts impact and risk assessments for its activities in order to identify and manage environmental impacts and risks, which includes potential interaction with recreational and commercial fishers. To manage potential interactions, Woodside has the following controls in place with regard to the Petroleum Activities Program (PAP) of this EP: •Vessels adhere to regulatory requirements for navigational safety. •Notification to AHO of activities and movements to allow generation of navigation warnings (Maritime Safety Information Notifications (MSIN) and Notice to Mariners (NTM) (including AUSCOAST warnings where relevant)). •Establishment of temporary exclusion zones by relevant vessels which are communicated to marine users.	Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC, and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address Tuna Australia's functions, interests or activities. No additional EP controls are required. .

	•Vessels comply with regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements. Woodside also notes the following in relation to the points raised in Tuna Australia's feedback: •Routine marine vessel discharges will be managed in accordance with legislative and regulatory requirements (e.g. marine orders) •Any localised impacts to water quality, sediment quality and marine fish are likely to be intermittent and highlight localised and not expected to impact any commercial fisheries in the area. •Seabed disturbance will managed by undertaking project specific mooring design analysis, to reduce the risk of anchor drag leading to seabed disturbance. •Acoustic emissions from vessels in field and survey equipment will be managed by complying with regulatory requirements (e.g. EPBC Regulations 2000 – Part 8 Division 8.1). Woodside has consulted AFMA, DAFF - Fisheries, CFA, ASBTIA, Tuna Australia, 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.6**).	
Pearl Producers Association (PPA)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed PPA, advising of the proposed activity (Appendix F, reference 1.14) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed PPA, following up on the proposed activity (Appendix F, reference 2.12), and provided a Consultation Information Sheet. • On 15 February 2023, Woodside emailed PPA providing additional information on the proposed activity (Appendix F, reference 3.10), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed PPA following up on the proposed activity (Appendix F, reference 4.9) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address PPA's functions, interests or activities. No additional EP controls are required.
State Commercial fisheries and representative bodies		
Marine Aquarium Managed Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent a letter to Marine Aquarium Managed Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet. • On 9 March 2022, Woodside sent a letter to Marine Aquarium Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the

		commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Mackerel Managed Fishery (Area 2 and 3)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside sent a letter to Mackerel Managed Fishery (Area 2), advising of the proposed activity (Appendix F, reference 1.11) and provided a Consultation Information Sheet and fisheries map. • On 6 September 2022, Woodside sent a letter to Mackerel Managed Fishery (Area 2), following up on the proposed activity (Appendix F, reference 2.9) and provided a Consultation Information Sheet and fisheries map. • On 17 February 2023, Woodside sent a letter to Mackerel Managed Fishery (Area 2 and 3) providing additional information on the proposed activity (Appendix F, reference 3.23) and provided an updated Consultation Information Sheet. • On 9 March 2023, Woodside sent a letter Mackerel Managed Fishery (Area 2 and 3) following up on the proposed activity (Appendix F, reference 4.30) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and

		Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Pilbara Crab Managed Fishery		
Summary of consultation provided and responses: • On 16 August 2022, Woodside sent a letter to the Pilbara Crab Fishery, advising of the proposed activity (Appendix F, reference 1.11) and provided a Consultation Information Sheet and fisheries map. • On 6 September 2022, Woodside sent a letter to the Pilbara Crab Fishery, following up on the proposed activity (Appendix F, reference 2.8) and provided a Consultation Information Sheet and fisheries map. • On 17 February 2023, Woodside sent letter to Pilbara Crab Managed Fishery providing additional information on the proposed activity (Appendix F, reference 3.23), and provided an updated Consultation Information Sheet • On 9 March 2023, Woodside sent letter to Pilbara Crab Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the

		commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
West Coast Deep Sea Crustacean Managed Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent a letter to West Coast Deep Sea Crustacean Managed Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent a letter to West Coast Deep Sea Crustacean Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP.

		Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Specimen Shell Managed Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent a letter to Specimen Shell Managed Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent a letter to Specimen Shell Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.

Land Hermit Crab Managed Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent a letter to the Land Hermit Crab Managed Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet • On 9 March 2023, Woodside sent a letter to the Land Hermit Crab Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Onslow Prawn Managed Fishery (Area 1 and 2)		

Summary of consultation provided and responses:

- On 17 February 2023, Woodside sent a letter to Onslow Prawn Managed Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet.
- On 9 March 2023, Woodside sent a letter to Onslow Prawn Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.

Western Australian Sea Cucumber Fishery

Summary of consultation provided and responses:

- On 17 February 2023, Woodside sent a letter to Western Australian Sea Cucumber Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet.

- On 9 March 2023, Woodside sent a letter to Western Australian Sea Cucumber Fishery following up on the proposed activity (Appendix F, reference 4.30) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.

Exmouth Gulf Prawn Managed Fishery

Summary of consultation provided and responses:

- On 17 February 2023, Woodside sent letter to Exmouth Gulf Prawn Managed Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet.
- On 9 March 2023, Woodside sent letter to Exmouth Gulf Prawn Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Gascoyne Demersal Scalefish Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to Gascoyne Demersal Scalefish Fishery advising of the proposed activity (Appendix F, reference 3.22), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to Gascoyne Demersal Scalefish Fishery following up on the proposed activity (Appendix F, reference 4.32) 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**	**Environment Plan Controls**

No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
West Coast Demersal Scalefish Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to West Coast Demersal Scalefish Fishery advising of the proposed activity (Appendix F, reference 3.22), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to West Coast Demersal Scalefish Fishery following up on the proposed activity (Appendix F, reference 4.32) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted DPIRD, WAFIC and individual relevant licence holders.	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** 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 7.6**).	Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
West Coast Rock Lobster Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to West Coast Rock Lobster Fishery advising of the proposed activity (Appendix F, reference 3.22), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to West Coast Rock Lobster Fishery following up on the proposed activity (Appendix F, reference 4.32) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and

		Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Nickol Bay Prawn Managed Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent a letter to Nickol Bay Prawn Managed Fishery advising of the proposed activity (Appendix F, reference 3.23), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent a letter to Nickol Bay Prawn Managed Fishery following up on the proposed activity (Appendix F, reference 4.30) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP.

		Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Shark Bay Crab Managed Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to Shark Bay Crab Fishery advising of the proposed activity (Appendix F, reference 3.22), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to Shark Bay Crab Fishery following up on the proposed activity (Appendix F, reference 4.32) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.

Shark Bay Prawn Managed Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to Shark Bay Prawn Fishery advising of the proposed activity (Appendix F, reference 3.22), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to Shark Bay Prawn Fishery following up on the proposed activity (Appendix F, reference 4.32) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Shark Bay Scallop Managed Fishery		

Summary of consultation provided and responses:

- On 17 February 2023, Woodside sent letter to Shark Bay Scallop Fishery advising of the proposed activity (Appendix F, reference 3.22), and provided a Consultation Information Sheet.
- On 9 March 2023, Woodside sent letter to Shark Bay Scallop Fishery following up on the proposed activity (Appendix F, reference 4.32) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.

Abrolhos Islands and Midwest Trawl Limited Entry Managed Fishery (Area 1)

Summary of consultation provided and responses:

- On 27 February 2023, Woodside sent letter to Abrolhos Islands and Mid West Trawl Managed Fishery advising of the proposed activity (Appendix F, reference 3.43), and provided a Consultation Information Sheet.

- On 31 March 2023, Woodside sent letter to Abrolhos Islands and Mid West Trawl Managed Fishery following up on the proposed activity (Appendix F, reference 4.42) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Exmouth Gulf Beach Seine and Mesh Net Managed Fishery		

Summary of consultation provided and responses:

- On 27 February 2023, Woodside sent letter to Exmouth Gulf Beach Seine and Mesh Net Managed Fishery advising of the proposed activity (Appendix F, reference 3.44), and provided a Consultation Information Sheet.
- On 31 March 2023, Woodside sent letter to Exmouth Gulf Beach Seine and Mesh Net Managed Fishery following up on the proposed activity (Appendix F, reference 4.43) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
West Coast Demersal Scalefish Fishery		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to West Coast Demersal Scalefish Fishery advising of the proposed activity (Appendix F, reference 3.22), and provided a Consultation Information Sheet • On 9 March 2023, Woodside sent letter to West Coast Demersal Scalefish Fishery following up on the proposed activity (Appendix F, reference 4.32) 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**	**Environment Plan Controls**

No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Pilbara Trawl Fishery		
Summary of consultation provided and responses: • On 8 March 2023, Woodside emailed Pilbara Trawl Fishery advising of the proposed activity (Appendix F, reference 4.29) and provided a Consultation Information Sheet. • On 31 March 2023, Woodside emailed Pilbara Trawl Fishery following up on the proposed activity Appendix F, reference 4.41).		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted DPIRD, WAFIC and individual relevant licence holders.	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery 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 7.6**).	that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Pilbara Trap Fishery		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed the Pilbara Trap Fishery, advising of the proposed activity (Appendix F, reference 1.10) and provided a Consultation Information Sheet and fisheries map. • On 6 September 2022, Woodside emailed the Pilbara Trap Fishery, following up on the proposed activity (Appendix F, reference 2.7) and provided a Consultation Information Sheet and fisheries map. • On 8 March 2023, Woodside emailed Pilbara Trap Fishery providing additional information on the proposed activity (Appendix F, reference 4.29) and provided an updated Consultation Information Sheet. • On 31 March 2023, Woodside emailed Pilbara Trap Fishery following up on the proposed activity (Appendix F, reference 4.41).		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted DPIRD, WAFIC and individual relevant licence holders.	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery 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 7.6**).	that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Pilbara Line Fishery		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed the Pilbara Line Fishery, advising of the proposed activity (Appendix F, reference 1.10) and provided a Consultation Information Sheet and fisheries map. • On 6 September 2022, Woodside emailed the Pilbara Line Fishery, following up on the proposed activity (Appendix F, reference 2.7), and provided a Consultation Information Sheet and fisheries map. • On 8 March 2023, Woodside emailed Pilbara Line Fishery providing additional information on the proposed activity (Appendix F, reference 4.29) and provided an updated Consultation Information Sheet. • On 31 March 2023, Woodside emailed Pilbara Line Fishery following up on the proposed activity Appendix F, reference 4.41).		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside has consulted DPIRD, WAFIC and individual relevant licence holders.	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery 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 7.6**).	that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address the fisheries functions, interests or activities. No additional EP controls are required.
Western Australian Fishing Industry Council (WAFIC)		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed WAFIC advising of the proposed activity (Appendix F, reference 1.15) and provided a Consultation Information Sheet and fisheries map. • On 29 August 2022, WAFIC responded acknowledging receipt of Woodside's email and asked for clarification on whether commercial fishers are able to operate within the 50 km² and the 4 km Operational Area. • On 31 August 2022, Woodside responded, thanking WAFIC for its email. Woodside confirmed commercial fishers and other marine users are permitted to use but should take care when entering both the 50 km² and the 4 km Operational Areas and remain clear of the 500m safety exclusion zone. • On 2 September 2022, WAFIC responded thanking Woodside for its confirmation regarding cautionary zones and confirmed it had no further comments. • On 7 September 2022, Woodside responded thanking WAFIC for its response. • On 16 February 2023, Woodside emailed WAFIC providing additional information on the proposed activity (Appendix F, reference 3.12), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed WAFIC following up on the proposed activity (Appendix F, reference 4.10) and requested any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**

WAFIC responded and asked for clarification on whether commercial fishers are able to operate within the 50 km² and the 4 km Operational Area. No objections or claims have been received about activity impacts or risks despite follow up.	Woodside has addressed WAFIC's feedback including confirming commercial fishers and other marine users are permitted to use but should take care when entering both the 50 km² and the 4 km Operational Areas and remain clear of the 500m safety exclusion zone. 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address WAFIC's functions, interests or activities. No additional EP controls are required.
Western Rock Lobster Council		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed the Western Rock Lobster Council advising of the proposed activity (Appendix F, reference 3.46), and provided a Consultation Information Sheet. • On 27 February 2023, the Western Rock Lobster Managed Fishery emailed Woodside to request a map of all the activities Woodside is undertaking that it's relevant to and if there are timeframes in relation to each activity. • On 1 March 2023, Woodside emailed the Western Rock Lobster Council advising of the proposed activity and provided a Consultation Information Sheet (includes maps, summaries of potential key impacts and risks, and associated management measures) and timeframe for feedback. • On 14 March 2023, Woodside emailed the Western Rock Lobster Council following up on the proposed activity (Appendix F, reference 4.1). • On 20 March 2023, Western Rock Lobster responded, thanking Woodside for their email and requested an extension of 2 weeks on the feedback dates. • On 30 March 2023, Woodside responded confirming the requested extension to provide feedback. • On 12 April 2023, Woodside emailed the Western Rock Lobster Council to follow up on feedback relating to the proposed activity.		

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
Western Rock Lobster Managed Fishery emailed Woodside to request a map of all the activities Woodside is undertaking that it's relevant to and if there are timeframes in relation to each activity. It then requested an extension of 2 weeks on the feedback No objections or claims have been received about activity impacts or risks.	Woodside has provided the Western Rock Lobster Council with an extension to provide feedback on the proposed EP to 8 April 2023. Woodside has consulted DPIRD, WAFIC, the Western Rock Lobster Council 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 7.6**).	Woodside has assessed the relevancy of State fisheries issues in **Section 4.9.3** of this EP. Woodside will provide notifications to DPIRD, WAFIC and relevant Fishery Licence Holders that have the potential to be directly impacted by planned activities in the Operational Area (Pilbara Line Fishery and Pilbara Trap Fishery) prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address Western Rock Lobster Council's functions, interests or activities. No additional EP controls are required.
Recreational marine users and representative bodies		
Exmouth recreational marine users		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Exmouth Recreational Marine Users advising of the proposed activity (Appendix F, reference 3.15), and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed Exmouth Recreational Marine Users following up on the proposed activity (Appendix F, reference 4.12) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Exmouth recreational marine users' functions, interests or activities. No additional EP controls are required.
Gascoyne Recreational Marine Users		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to Gascoyne Recreational Marine Users advising of the proposed activity (Appendix F, reference 3.21), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to Gascoyne Recreational Marine Users following up on the proposed activity (Appendix F, reference 4.31) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Gascoyne recreational marine users' functions, interests or activities. No additional EP controls are required.

Pilbara/Kimberley Recreational Marine Users		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to Pilbara/Kimberley Recreational Marine Users advising of the proposed activity (Appendix F, reference 3.21), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to Pilbara/Kimberley Recreational Marine Users following up on the proposed activity (Appendix F, reference 4.31) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Pilbara/Kimberley recreational marine users' functions, interests or activities. No additional EP controls are required.
West Coast Recreational Marine Users		
Summary of consultation provided and responses: • On 17 February 2023, Woodside sent letter to West Coast Recreational Marine Users advising of the proposed activity (Appendix F, reference 3.21), and provided a Consultation Information Sheet. • On 9 March 2023, Woodside sent letter to West Coast Recreational Marine Users following up on the proposed activity (Appendix F, reference 4.31) 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**	**Environment Plan Controls**

No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Exmouth recreational marine users' functions, interests or activities. No additional EP controls are required.
Karratha Recreational Marine Users		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed Karratha based charter, boat tourism and dive operators, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed Karratha based charter, boat tourism and dive operators, following up on the proposed activity (Appendix F, reference 2.1), and provided a Consultation Information Sheet. • On 16 February 2023, Woodside emailed Karratha Recreational Marine Users providing additional information on the proposed activity (Appendix F, reference 3.15), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Exmouth Recreational Marine Users following up on the proposed activity (Appendix F, reference 4.12) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Karratha recreational marine users' functions, interests or activities. No additional EP controls are required.

Recfishwest

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed Recfishwest, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.
- On 6 September 2022, Woodside emailed Recfishwest, following up on the proposed activity (Appendix F, reference 2.1), and provided a Consultation Information Sheet.
- On 16 February 2023, Woodside emailed Recfishwest providing additional information on the proposed activity (Appendix F, reference 3.13), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed Recfishwest following up on the proposed activity (Appendix F, reference 4.11) and to request any feedback.
- On 9 March 2023, Recfishwest responded with the following comments:
    - i. Potential impacts on recreational fishing, including charter fishing, due to the proposed activities' proximity to the Montebello Islands.
    - ii. 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.
    - iii. No objection to the plug and abandonment of the Julimar South-1 well if Woodside does not develop it, as subsea structures can develop productive fish habitats.
    - iv. No objection to Woodside's proposed activities.

- On 18 March 2023, Woodside responded thanking Recfishwest for their feedback and confirmed that Woodside will provide commencement and cessation of activity notifications to Recfishwest for the proposed activities.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
Response from Recfishwest requesting info on: • Potential impacts on recreational fishing, including charter fishing, due to the proposed activities' proximity to the Montebello Islands.	Woodside has addressed Recfishwest's feedback and has confirmed it will provide updates to Recfishwest on project progress and completion. 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	Woodside will provide notifications to Recfishwest prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address Recfishwest's functions, interests or activities.

• 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. No objections or claims have been received about activity impacts or risks.	appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.6**).	No additional EP controls are required.
Marine Tourism WA		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed Marine Tourism WA, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed Marine Tourism WA, following up on the proposed activity (Appendix F, reference 2.1), and provided a Consultation Information Sheet. • On 16 February 2023, Woodside emailed Marine Tourism WA providing additional information on the proposed activity (Appendix F, reference 3.13), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Marine Tourism WA following up on the proposed activity (Appendix F, reference 4.11) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see Section 5.2). 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 7.6).	Woodside considers the measures and controls in the EP address Marine Tourism WA's functions, interests or activities. No additional EP controls are required.

WA Game Fishing Association		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed WA Game Fishing Association, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed WA Game Fishing Association, following up on the proposed activity (Appendix F, reference 2.1), and provided a Consultation Information Sheet. • On 16 February 2023, Woodside emailed WA Game Fishing Association providing additional information on the proposed activity (Appendix F, reference 3.13), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed WA Game Fishing Association following up on the proposed activity (Appendix F, reference 4.11) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address WA Game Fishing Association's functions, interests or activities. No additional EP controls are required.
Titleholders and Operators		
Chevron Australia/ Osaka Gas Gorgon/ Tokyo Gas Gorgon/ JERA Gorgon		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed Chevron Australia, advising of the proposed activity (Appendix F, reference 1.14 and 1.21) and provided a Consultation Information Sheet and Titleholder map.		

- On 6 September 2022, Woodside emailed Chevron Australia, following up on the proposed activity (Appendix F, reference 2.10) and provided a Consultation Information Sheet and Titleholder map.
- On 16 February 2023, Woodside emailed Chevron Australia providing additional information on the proposed activity (Appendix F, reference 3.16), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed Chevron Australia following up on the proposed activity (Appendix F, reference 4.13) and to request any feedback.
- On 22 March 2023, Chevron responded, thanking Woodside for the consultation information, advising that they are actively reviewing the information (expected completion by mid-April), and requesting GIS shape files for the EP.
- On 3 April 2023, Woodside responded, thanking Chevron for the feedback and provided the GIS shape files for the EP as requested.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
Chevron responded, requesting GIS shape files to review the potential effect on their interests and activities. No objections or claims have been received about activity impacts or risks.	Woodside has provided Chevron with GIS shape files for the EP as requested. Chevron has advised it will provide feedback on the EP in mid-April, which Woodside will address as applicable. Woodside considers the measures and controls in the EP address Chevron Australia's functions, interests or activities. Woodside engages in ongoing consultation throughout the life of an EP. Woodside will apply its Management of Change and Revision process (see Section 7.6) if required.	Woodside considers the measures and controls in the EP address Chevron Australia's functions, interests or activities. No additional EP controls are required.

Western Gas

Summary of consultation provided and responses:

- On 16 February 2023, Woodside emailed Western Gas advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed Western Gas following up of the proposed activity (Appendix F, reference 4.13) 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	Environment Plan Controls

No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP Western Gas's functions, interests or activities. No additional EP controls are required.
Exxon Mobil Australia Resources Company		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed Exxon Mobil Australia Resources Company, advising of the proposed activity (Appendix F, reference 1.14) and provided a Consultation Information Sheet and Titleholder map. • On 6 September 2022, Woodside emailed Exxon Mobil Australia Resources Company, following up on the proposed activity (Appendix F, reference 2.11), and provided a Consultation Information Sheet and Titleholder map. • On 16 February 2023, Woodside emailed Exxon Mobil Australia Resources Company providing additional information on the proposed activity (Appendix F, reference 3.16), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Exxon Mobil Australia Resources Company following up on the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Exxon Mobil Australia's functions, interests or activities. No additional EP controls are required.
Shell Australia		

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed Shell Australia, advising of the proposed activity (Appendix F, reference 1.14 and 1.21) and provided a Consultation Information Sheet and Titleholder map.
- On 6 September 2022, Woodside emailed Shell Australia, following up on the proposed activity (Appendix F, reference 2.11), and provided a Consultation Information Sheet and Titleholder map.
- On 6 September 2022, Shell Australia responded, confirming is had no feedback for the proposed EP.
- On 7 September 2022, Woodside responded, thanking Shell Australia for its response.
- On 16 February 2023, Woodside emailed Shell Australia providing additional information on the proposed activity (Appendix F, reference 3.16), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed Shell Australia following up on the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
Shell advised it had no comments on the proposed EP. No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Shell 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 7.6**).	Woodside considers the measures and controls in the EP address Shell Australia's functions, interests or activities. No additional EP controls are required.

BP Developments Australia

Summary of consultation provided and responses:

- On 16 February 2023, Woodside emailed BP Developments Australia advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed BP Developments Australia following up on the proposed activity (Appendix F, reference 4.13) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address BP Developments Australia's functions, interests or activities. No additional EP controls are required.
Carnarvon Energy		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Carnarvon Energy advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Carnarvon Energy following up on the proposed activity (Appendix F, reference 4.13) and to request any feedback. • On 8 March 2023, Carnarvon Energy responded thanking Woodside for its email and confirmed they had no comments. • On 8 March 2023, Woodside responded thanking Carnarvon Energy for its email.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
Carnarvon Energy advised it had no comments on the proposed EP. No objections or claims have been received about activity impacts or risks despite follow up.	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 7.6**).	Woodside considers the measures and controls in the EP address Carnarvon Energy's functions, interests or activities. No additional EP controls are required.
PE Wheatstone		

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed PE Wheatstone advising of the proposed activity (Appendix F, reference 1.14 and 1.21) and provided a Consultation Information Sheet and Titleholder map.
- On 6 September 2022, Woodside emailed PE Wheatstone, following up on the proposed activity (Appendix F, reference 2.11), and provided a Consultation Information Sheet and Titleholder map.
- On 6 September 2022, PE Wheatstone responded, thanking Woodside for its email and confirmed it had no feedback for the proposed EP.
- On 7 September 2022, Woodside responded, thanking PE Wheatstone for its response.
- On 16 February 2023, Woodside emailed PE Wheatstone providing additional information on the proposed activity (Appendix F, reference 3.16), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed PE Wheatstone following up of the proposed activity (Appendix F, reference 4.13) 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	Environment Plan Controls
PE Wheatstone has confirmed it has no feedback on the proposed activity. No objections or claims have been received about activity impacts or risks despite follow up.	PE Wheatstone has confirmed it has no feedback relating to the proposed activity. 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 7.6**).	Woodside considers the measures and controls in the EP address PE Wheatstone's functions, interests or activities. No additional EP controls are required.

Kyushu Electric Wheatstone

Summary of consultation provided and responses:

- On 16 August 2022, Woodside emailed Kyushu Electric Wheatstone, advising of the proposed activity (Appendix F, reference 1.14 and 1.21) and provided a Consultation Information Sheet and Titleholder map.
- On 6 September 2022, Woodside emailed Kyushu Electric Wheatstone, following up on the proposed activity (Appendix F, reference 2.11), and provided a Consultation Information Sheet and Titleholder map.

• On 16 February 2023, Woodside emailed Kyushu Electric Wheatstone providing additional information on the proposed activity (Appendix F, reference 3.16), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Kyushu Electric Wheatstone following up on the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Kyushu Electric Wheatstone's functions, interests or activities. No additional EP controls are required.
Eni Australia		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed ENI Australia advising of the proposed activity (Appendix F, reference 3.16), and provided an Updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed ENI Australia following up of the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Eni Australia's functions, interests or activities. No additional EP controls are required.

Fugro Exploration		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Fugro Exploration advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Fugro Exploration following up of the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP Fugro Exploration's address functions, interests or activities. No additional EP controls are required.
Finder No 9/10/16/17		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Finder No 9 /10/16/17 advising of the proposed activity (Appendix F, reference 3.16), and provided an Updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Finder No 9 /10/16/17 following up of the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**).	Woodside considers the measures and controls in the EP address Finder No 9/10/16/17 functions, interests or 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 7.6**).	No additional EP controls are required.
KUFPEC		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed KUFPEC Australia (Wheatstone lago), advising of the proposed activity (Appendix F, reference 1.14 and 1.21) and provided a Consultation Information Sheet and Titleholder map. • On 6 September 2022, Woodside emailed KUFPEC Australia (Wheatstone lago), following up on the proposed activity (Appendix F, reference 2.11) and provided a Consultation Information Sheet and Titleholder map. • On 16 February 2023, Woodside emailed KUFPEC providing additional information on the proposed activity (Appendix F, reference 3.16), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed KUFPEC following up on the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address KUFPEC's functions, interests or activities. No additional EP controls are required.
Santos NA Energy Holdings / Santos Ltd / Santos WA Northwest / Santos Offshore / Santos WA Southwest / Santos (BOL) / Santos WA PVG		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed Santos WA Northwest, advising of the proposed activity (Appendix F, reference 1.14 and 1.21) and provided a Consultation Information Sheet and Titleholder map. • On 6 September 2022, Woodside emailed Santos WA Northwest, following up on the proposed activity (Appendix F, reference 2.11), and provided a Consultation Information Sheet and Titleholder map.		

- On 16 September 2022, Santos responded, confirming the proposed activity will not have any impact on Santos' current and planned operations.
- On 16 February 2023, Woodside emailed Santos providing additional information on the proposed activity (Appendix F, reference 3.16), and provided an updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed Santos following up of the proposed activity (Appendix F, reference 4.13) 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	Environment Plan Controls
Santos confirmed the proposed activity will not have any impact on its current or planned operations. No objections or claims have been received about activity impacts or risks despite follow up.	Santos has confirmed the proposed activity will not have any impact on Santos' current and planned operations. Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Santos NA Energy Holdings / Santos Ltd / Santos WA Northwest / Santos Offshore / Santos WA Southwest / Santos (BOL) / Santos WA PVG's functions, interests or activities. No additional EP controls are required.

Coastal Oil and Gas

Summary of consultation provided and responses:

- On 16 February 2023, Woodside emailed Coastal Oil and Gas advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed Coastal Oil and Gas following up of the proposed activity (Appendix F, reference 4.13) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**).	Woodside considers the measures and controls in the EP address Coastal Oil and Gas functions, interests or activities. No additional EP 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 7.6**).	
Bounty Oil and Gas		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Bounty Oil and Gas advising of the proposed activity (Appendix F, reference 3.16), and provided Updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Bounty Oil and Gas following up of the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Bounty Oil and Gas functions, interests or activities. No additional EP controls are required.
OMV Australia / Sapura OMV Upstream		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Sapura OMV Upstream / OMV Australia advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Sapura OMV Upstream / OMV Australia and Gas following up of the proposed activity (Appendix F, reference 4.13) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address OMV Australia / Sapura OMV Upstream functions, interests or activities. No additional EP controls are required.
KATO Energy / KATO Corowa		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Kato Energy advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed Kato Energy following up of the proposed activity (Appendix F, reference 4.13) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address KATO Energy / KATO Corowa's functions, interests or activities. No additional EP controls are required.
INPEX Alpha		

Summary of consultation provided and responses:

- On 16 February 2023, Woodside emailed INPEX Alpha advising of the proposed activity (Appendix F, reference 3.16), and provided a Updated Consultation Information Sheet.
- On 7 March 2023, Woodside emailed INPEX Alpha following up of the proposed activity (Appendix F, reference 4.13) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address INPEX Alpha's functions, interests or activities. No additional EP controls are required.

JX Nippon O&G Exploration (Australia)

Summary of consultation provided and responses:

- On 24 February 2023, Woodside emailed JX Nippon advising of the proposed activity (Appendix F, reference 3.37), and provided a Consultation Information Sheet.
- On 24 February 2023, JX Nippon responded, thanking Woodside for its email and confirmed they will revert back.
- On 7 March 2023, Woodside emailed JX Nippon following up of the proposed activity (Appendix F, reference 4.22) and to request any feedback
- On 10 March 2023, Woodside emailed JX Nippon following up of the proposed activity (Appendix F, reference 4.33) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**).	Woodside considers the measures and controls in the EP address JX Nippon O&G

	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 7.6**).	Exploration (Australia) functions, interests or activities. No additional EP controls are required.
National Energy Resource Australia (NERA) Collaborative Seismic Environment Plan Project (CSEP) acting for a consortium of operators		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed NERA advising of the proposed activity (Appendix F, reference 3.14), and provided a Updated Consultation Information Sheet • On 24 February 2023, NERA responded, thanking Woodside for its email and confirmed it had no feedback for the proposed EP and would like to kept up to date with when the activities occur. • On 28 February 2023, Woodside responded, thanking NERA for their feedback and confirmed that Woodside will provide NERA with commencement and cessation of activity notifications. • On 1 March 2023, NERA responded confirming NERA will also keep Woodside updated with the progress of the CSEP.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
NERA advised it had no feedback on the proposed activities but requested to be kept up to date with when the activities occur. No objections or claims have been received about activity impacts or risks despite follow up.	NERA has confirmed it has no feedback relating to the proposed activity. Woodside will provide notifications to NERA prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. 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 7.6**).	Woodside will provide notifications to NERA prior to the commencement and at the end of the activity, as referenced as **PS 4.4** in this EP. Woodside considers the measures and controls in the EP address NERA's functions, interests or activities. No additional EP controls are required.

Peak Industry Representative bodies		
APPEA		
Summary of consultation provided and responses: • On 16 August 2022, Woodside emailed APPEA, advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet. • On 6 September 2022, Woodside emailed APPEA, following up on the proposed activity (Appendix F, reference 2.1), and provided a Consultation Information Sheet. • On 16 February 2023, Woodside emailed APPEA providing additional information on the proposed activity (Appendix F, reference 3.14), and provided an updated Consultation Information Sheet. • On 7 March 2023, Woodside emailed APPEA following up on the proposed activity (Appendix F, reference 4.15) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address APPEA's functions, interests or activities. No additional EP controls are required.
Traditional Custodians		
Murujuga Aboriginal Corporation (MAC)		
Summary of consultation provided and responses: • On 24 February 2023, Woodside emailed MAC advising of the proposed activity (Appendix F, reference 3.39) and provided a Consultation Information Sheet. • On 7 March, Woodside spoke with MAC to follow up on the material provided. • On 30 March, Woodside spoke with MAC and followed up on the material provided. • On 3 April MAC emailed Woodside asking for a list of outstanding issues that Woodside would like to progress • On 5 April 2023 Woodside responded to MAC via email with a list of open topics, which included the request for feedback on the proposed activity. Woodside requested advice from MAC on:		

- How the activity could impact cultural values
- If MAC proposes anything to be included in the EP prior to submission
- If MAC would like a meeting to discuss the activity
- Whether MAC does not intend to provide advice prior to EP submission

- On 12 April, Woodside spoke with MAC regarding a number of topics including feedback on the proposed activity. MAC responded that their Board of Directors are meeting soon and that Woodside can expect a forward plan on EP consultation
-

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
In consultation in the course of preparing the EP since 24 February 2023, MAC has not provided feedback, objections or claims to date in response to the information provided	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address MAC's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.

Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)

Summary of consultation provided and responses:

- On 6 January 2023, Woodside phoned NTGAC via the representative body Yamatji Marlpa Aboriginal Corporation (YMAC) for the purpose of introduction and to explain that Woodside will be sending information concerning EPs.
- Between 1 and 13 February 2023, Woodside and YMAC had a series of phone conversations and emails confirming a meeting with the NTGAC Board on 16 February 2023.
- On 10 February 2023, Woodside spoke with NTGAC to inform that the petroleum activity will be advertised for feedback and that Woodside will provide information on the activity and include it in the scope of the meeting planned for 16 February
- On 16 February 2023, Woodside presented to a meeting of the NTGAC/YMAC Board:
  - 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.
  - Woodside encouraged NTGAC to raise anything which they feel is missing in the information provided during the meeting.
  - Woodside 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.

- Woodside described the proposed activity, its timing and purpose
  - NTGAC requested a picture of a wellhead, which Woodside noted for future action
- Woodside 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. It was noted that at a high level the categories of risks and impacts are similar to decommissioning previously discussed
- Woodside described the worst case EMBA for the activity
  - NTGAC asked for further explanation of how the EMBA is developed for the activity, Woodside responded using an example of a deterministic scenario to describe how replicates are combined
  - NTGAC asked what probability of a blowout or vessel collision, Woodside responded that it is expected to be about 1 in 10,000 years
- Woodside concluded discussion of the activity and asked for further feedback or questions, none were received.

- On 21 February 2023, NTGAC/YMAC emailed Woodside to seek clarification of the attendee names at the 16 February 2023 Board meeting.
- On 21 February 2023, Woodside emailed NTGAC/YMAC the attendee names at the 16 February 2023 Board meeting and provided a copy of the presentation pack. Woodside followed up on request for any further feedback on the proposed activity.
- On 22 February 2023, NTGAC (via YMAC) responded thanking and acknowledging Woodside for its email.
- On 22 March 2023, Woodside emailed NTGAC (via YMAC) following up on the proposed activity and to request any feedback.
- On 24 March 2023, NTGAC (via YMAC) responded that it would let Woodside know as soon as the Board has had the opportunity to review and provide comments.
- On 24 March 2023, Woodside emailed NTGAC (via YMAC) if Woodside can assist with anything.
- On 28 March 2023, NTGAC (via YMAC) emailed Woodside requested few images and a diagram of a wellhead so that this can be forwarded through to the relevant NTGAC Directors.
- On 31 March 2023, Woodside emailed NTGAC (via YMAC) provided pictures / Diagram of wellhead as requested.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
During face-to-face engagement, the NTGAC requested further information on topics related to this proposed activity which was responded to during the meeting: • The expected probability of well loss of containment and vessel collision	Woodside continues to engage NTGAC via YMAC in relation to feedback following the 16 February 2023 Board meeting. No material issues or concerns related to the proposed activity were raised during consultation to date. Woodside invited further feedback in accordance with Woodside's approach to ongoing consultation (see **Section 7.6**). Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received (including any relevant new information on cultural values),	Woodside considers the measures and controls in the EP NTGAC's functions, interests or activities. Based on the engagement to date, no additional controls are required.

• An image of a wellhead for information. The NTGAC expressed a desire for ongoing engagement and partnership.	it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (refer to **Section 7.6**).	

Buurabalayji Thalanyji Aboriginal Corporation (BTAC)

Summary of consultation provided and responses:

- On 10 January 2023, Woodside emailed BTAC to set up an introductory discussion on a number of proposed activities:
    - Woodside advised it would like to and is required to consult with Thalanyji about the nature of any interests Thalanyji have in the "environment that may be affected" (EMBA) by this work, and any concerns Thalanyji may have about potential environmental impacts, so these concerns can be addressed through the environmental planning and approvals process.
    - Woodside provided further information about government guidelines for these consultations and provided a link to https://consultation.nopsema.gov.au/environment-division/consultation-guideline/.
    - Woodside advised information sheets on proposed activities will be provided
- On 20 February 2023, BTAC provided a letter to Woodside specific to consultation on other proposed activities, seeking support from Woodside and expressing desire to be involved in local emergency response capability. Woodside responded to this, and there has been other correspondence unrelated to this activity since.
- On 22 February 2023, Woodside emailed BTAC advising of the proposed activity (Appendix F, reference 3.35) and provided a Consultation Information Sheet
- On 17 March 2023, Woodside emailed BTAC suggesting a forward plan for consultation on all EPs that Woodside has notified BTAC about:
    - Woodside will formalise the matters outlined in its correspondence by including in each of the Environment Plans statements along the following lines:
        - BTAC for and on behalf of Thalanyji has interests and values in the EMBAs and is concerned about the possible impact on these interests and values, including to Sea Country, arising from Woodside's proposed activities.
        - BTAC, with support from Woodside and through the provision of independent expertise, will on an ongoing basis:
            i. convey to Woodside the nature of Thalanyji's interests and values, noting that BTAC would like to conduct work to articulate those values in a manner that Woodside understands.
            ii. provide information to Woodside about how those interests and values intersect with the EMBAs and how that should be managed.
        - Woodside will engage in ongoing consultation with BTAC for the purposes of ongoing monitoring, management and emergency response associated with environmental risk.

• Woodside and BTAC will work under an adaptive management approach as the understanding of each other's values and interests, activities, needs and aspirations grow during the course of ongoing consultation. This means that Woodside's Environment Plans may be updated from time to time so they accurately reflect environmental risk as they relate to BTAC's interests and values, and the management measures that Woodside and BTAC will put in place to avoid and otherwise mitigate and manage environmental risk. • BTAC can at any time can make direct representations to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) about the nature of BTAC's interests and how they may be affected by Woodside's activities. • On 30 March 2023, Woodside spoke with BTAC to follow up on correspondence described above. BTAC indicated that they desire a consultation agreement and intend to provide correspondence accordingly.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
Through written correspondence relevant to the activity, BTAC has: • Requested Woodside supports BTAC in obtaining technical advice relating to the proposed activity • Expressed desire to be involved in local emergency response capability Woodside has responded to these items accordingly. BTAC expressed a desire for ongoing engagement and partnership	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address the BTAC's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.
Yinggarda Aboriginal Corporation (YAC)		

Summary of consultation provided and responses:

- On 22 February 2023, Woodside emailed YAC advising of the proposed activity (Appendix F, reference 3.34) and provided a Consultation Information Sheet. Woodside noted it is seeking YAC's feedback as soon as possible on the proposed activity.
- On 24 February 2023, Woodside followed up with YAC/YMAC via phone call. YAC/YMAC advised it will send an email on 24 February to discuss an invitation for Woodside to meet with YAC.
- On 20 March 2023, Woodside emailed YMAC to follow up the discussed invitation for a face-to-face meeting with its Board of Directors
- On 23 March 2023, YMAC responded and proposed a meeting on 3 May 2023 in Carnarvon and provided an estimated of its proposed costs. The invitation was accepted and arrangements made for a pre-meeting with YMAC to coordinate details.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
In consultation in the course of preparing the EP since 22 February 2023, YAC has not provided feedback, objections or claims to date in response to the information provided YAC invited Woodside to discuss the proposed activity with its Board of Directors, which has been arranged.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address the YAC's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.

Kariyarra Aboriginal Corporation

Summary of consultation provided and responses:

- On 24 February 2023, Woodside emailed the Kariyarra Aboriginal Corporation advising of the proposed activity (Appendix F, reference 3.38) and provided a Consultation Information Sheet. Email also followed up on previous correspondence and phone calls to determine interest for broader EP consultations.
- On 24 March 2023, Woodside emailed the Kariyarra Aboriginal Corporation following up on the proposed activity (Appendix F, reference 4.38) 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	Environment Plan Controls
In consultation in the course of preparing the EP since 24 February 2023, Kariyarra Aboriginal Corporation has not provided feedback, objections or claims to date in response to the information provided.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address the Kariyarra Aboriginal Corporation's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.
Wirrawandi Aboriginal Corporation (WAC)		

Summary of consultation provided and responses:
 	
• On 21 February 2023, Woodside spoke with WAC to discuss a consultation meeting.
• On 24 February 2023, Woodside emailed WAC advising of the proposed activity (Appendix F, reference 3.36) and provided a Consultation Information Sheet. Woodside noted it is seeking WAC's feedback as soon as possible on the proposed activity
  ○ Woodside also requested confirmation of the opportunity to meet with the WAC Board when they are next due to meet in Perth in March
• On 24 February 2023, WAC responded acknowledging Woodside's email and advised that a meeting is still yet to be finalised and that further details and associated costs will be discussed once the meeting has been confirmed.
• On 7 March 2023, WAC provided a formal quote, draft agenda and a meeting date of 23 March 2023.
• On 7 March 2023, Woodside responded thanking WAC for sending through the quote.
• On 15 March 2023, Woodside sent a follow up email to confirm details of the meeting on 23 March 2023.
• On 15 March 2023, WAC responded providing details of the date, time, venue, intent and agenda of the meeting on 23 March 2023.
• On 23 March 2023, Woodside presented to a meeting of the WAC Board and Elders in Perth:
  ○ 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.
  ○ Woodside encouraged WAC to raise anything which they feel is missing in the information provided during the meeting, or any issues or concerns.
  ○ Woodside 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.
  ○ Woodside described the proposed activity, timing and purpose
  ▪ . WAC asked how long these wells could be in operation for, Woodside responded that it varies but maximum could be 20-30 years		

- WAC asked about well decommissioning and how the state of the environment is assured afterwards, Woodside responded that post-decommissioning surveys are undertaken and these are available following the activity
  - Woodside 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.
  - WAC asked how the EMBA influences consultation, Woodside responded that the EMBA has always been understood but it is now being used to identify people who may have an interest in the activity
  - WAC stated that this kind of information sharing is important, and that our time is appreciated. WAC asked whether this type of information is broadly available to the community, Woodside responded that there are a number of open community sessions available in the region where it could be discussed
  - WAC indicated that since they are engaging with a number of energy industry operators they will consider the information provided and discuss internally before any further response.
  - Woodside provided personal contact details for further feedback
  - Woodside provided NOPSEMA contact details, should WAC desire to provide feedback directly to the regulator.
- On 24 March, Woodside responded thanking WAC for the meeting and proposed a venue and time for the next meeting.
- On 24 March 2023, WAC responded thanking Woodside for the meeting and accepted the invite for the next meeting.
- On 24 March 2023, Woodside responded thanking WAC for its email.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
During face-to-face engagement with the WAC board and directors and circle of elders, WAC requested further information on topics related to this proposed activity which was responded to during the meeting: • The expected operational lifespan of the well • Well decommissioning WAC expressed a desire for ongoing engagement and partnership.	Woodside has continued to engage WAC on the proposed activity and in relation to establishing a meeting with the joint Heritage Advisory Committee. No material issues or concerns related to the proposed activity were raised during consultation to date. Woodside invited further feedback in accordance with Woodside's approach to ongoing consultation (see **Section 7.6**). Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address the WAC's functions, interests or activities. Based on the engagement to date, no additional controls are required.
Robe River Kuruma Aboriginal Corporation (RRKAC)		

Summary of consultation provided and responses:

- On 20 February 2023, Woodside emailed RRKAC advising of the proposed activity (Appendix F, reference 3.28) and provided a Summary Information Sheet.
- On 24 February 2023, Woodside emailed RRKAC providing further information of the proposed activity (Appendix F, reference 3.41) and provided a Consultation Information Sheet.
- On 9 March 2023, RRKAC responded and advised that the interests of Robe River Kuruma people are best served through the joint Heritage Advisory Committee that is required under Yaburara Mardudhunera and Kuruma Marthudunera Indigenous Land Use Agreement.
    - RRKAC included Wirrawandi AC into the email as they are required to facilitate the Committee.
- Between 15-17 March 2023, Woodside exchanged email correspondence with RRKAC (and WAC) in relation to establishing a meeting with the joint Heritage Advisory Committee. The meeting was confirmed for 31 March 2023.
- On 31 March 2023, Woodside met with the Robe River Kuruma and Wirrawandi Joint Heritage Advisory Committee (HAC) in Karratha:
    - 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.
    - Woodside encouraged HAC to raise anything which they feel is missing in the information provided during the meeting, or any issues or concerns.
    - Woodside 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.
    - Woodside described the proposed activity
        - HAC asked where Woodside's gas goes to, Woodside responded that some goes to the state supply and most of the remainder goes to SE Asia as LNG
        - HAC asked whether the removal of hydrocarbons could cause global gravitational instability, Woodside responded that it is not considered credible and Woodside will provide a technical response separately
        - HAC asked what will happen if there is a gas leak, Woodside responded that dry gas would be released, and a portion would be dissolved into the water before reaching surface depending on water depth, and gas reaching the surface could be a safety risk or contribute to greenhouse gas in the atmosphere
    - Woodside 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.
    - WAC asked what response Woodside would implement for a diesel spill. Woodside responded that response arrangements are checked by NOPSEMA and since diesel rapidly evaporates and disperses response is mainly monitoring
    - Woodside provided personal contact details for further feedback
    - Woodside provided NOPSEMA contact details, should WAC desire to provide feedback directly to the regulator.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**

HAC requested further information on topics related to this proposed activity which was responded to during the meeting: • The market for Woodside gas • Impact of an unplanned subsea gas loss of containment The HAC expressed a desire for ongoing engagement and partnership.	Woodside continues to engage RRKAC in relation to the proposed activity. No material issues or concerns related to the proposed activity were raised during consultation to date. Woodside invited further feedback in accordance with Woodside's approach to ongoing consultation (see **Section 7.6**). Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address RRKAC's functions, interests or activities. Based on the engagement to date, no additional controls are required.
Ngarluma Aboriginal Corporation (NAC)		

Summary of consultation provided and responses:
 	
• On 24 February 2023, Woodside emailed NAC advising of the proposed activity (Appendix F, reference 3.42) and provided a Consultation Information Sheet.
 	
• On 24 February 2023, NAC emailed Woodside:
  ○ NAC acknowledged receipt of Woodside's emails and that it was yet to attend to the emails and would do so following the w/c 27 February 2023.
• On 9 March 2023, Woodside emailed NAC and left a phone message to follow up on the email received 24 February 2023:
  ○ Woodside advised it was seeking opportunity for Woodside to present to the NAC board with an EP overview and if there has been any progress in terms of securing a preferred day and timeslot.
• On 9 March 2023, NAC emailed Woodside to advise that the contact at NAC was unavailable to meet on 30 March 2023.
• On 9 March 2023, Woodside emailed NAC:
  ○ Woodside noted that during a previous meeting, NAC had advised its next board meeting would be held on 29 and 30 March and that Woodside would be potentially assigned time on the agenda to present to the NAC Board on either one of those days.		

- Woodside advised that this is an important opportunity to ensure that NAC board have the opportunity to provide feedback on the Environmental Plans and if they have interests in the environment that may be affected (EMBA).
- Woodside welcomed the suggestion of alternative days/times or ways that it can provide an overview to NAC the board.

- On 10 March 2023, NAC emailed Woodside to advise that its March Board Meeting is full with overspills from January and February and at this stage will need to leave the environmental plan consultation until the April meeting.
- On 14 March 2023, Woodside emailed NAC to request the dates for the April board meeting and to confirm what time Woodside might be allocated to present at NAC's earliest convenience.
- On 14 March 2023, NAC emailed Woodside to advise that the Board meeting is tentatively set for 29th April at this stage. NAC advised this needs to be confirmed with its Board before it can commit to a time or date

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
In consultation in the course of preparing the EP since 24 February 2023, NAC has not provided feedback, objections or claims to date in response to the information provided. NAC has invited Woodside to discuss the proposed activity with its Board of Directors, which has been arranged.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address NAC's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.

Yindjibarndi Aboriginal Corporation

Summary of consultation provided and responses:

- On 24 February 2023, Woodside emailed the Yindjibarndi Aboriginal Corporation advising of the proposed activity (Appendix F, reference 3.40) and provided a Consultation Information Sheet.
- On 26 February 2023, Yindjibarndi emailed Woodside:

○ Yindjibarndi advised that it will not be providing any comment on the proposed activity and noted it respected the traditional owners whose land and sea lies adjacent to, and within the precinct of, the projects, and will leave any comment and advice to be provided by them. • On 28 February 2023, Woodside emailed Yindjibarndi to thank them and noted the response		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
Yindjibarndi has provided a response and advised that it will not be providing any comment on the proposed activity.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address the Yindjibarndi Aboriginal Corporation's functions, interests or activities. No additional controls are required.
Wanparta Aboriginal Corporation		
Summary of consultation provided and responses: • On 24 February 2023, Woodside emailed Wanparta Aboriginal Corporation advising of the proposed activity (Appendix F, reference 3.45) and provided a Consultation Information Sheet. • On 2 March 2023, Wanparta responded to acknowledge receipt of material and informed that it was passed on to Directors who will advise whether any further engagement is required • On 24 March 2023, Woodside emailed Wanparta asking whether the Directors have any questions or have advised whether they wish to discuss further • On 27 March 2023, Wanparta contacted Woodside via email to clarify that the directors had not provided any questions or feedback		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**

In consultation in the course of preparing the EP since 24 February 2023, Wanparta has not provided feedback, objections to date or claims in response to the information provided.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address the Wanparta Aboriginal Corporation's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.
Malgana Aboriginal Corporation		

Summary of consultation provided and responses:
 	
• On 22 February 2023, Malgana emailed Woodside regarding scheduling an opportunity for Woodside to present at an upcoming Malgana Board Meeting.
• On 7 March 2023, Malgana emailed Woodside
  ○ Malgana provided proposed dates (3-4 April 2023) for a meeting.
  ○ Malgana requested if one or two hours is requested for Woodside's presentation and discussion.
• On 9 March 2023, Woodside emailed Malgana:
  ○ Woodside confirmed the proposed meeting dates and logistics.
  ○ Woodside requested a half day to present on the EPs on which it is seeking feedback.
• On 22 March 2023, Malgana emailed Woodside to coordinate the upcoming meeting
• On 17 March, Woodside emailed Malgana Aboriginal Corporation advising of the proposed activity and provided a Consultation Information Sheet, advising that they will be in the scope of the upcoming meeting and inviting feedback.
• On 4 March 2023, Woodside met with Malgana Aboriginal Corporation (Malgana) representatives in Perth.
  ○ 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.
  ▪ Malgana asked what arrangements are in place for earthquake tremors, Woodside responded that facilities and equipment are designed to withstand seismic activity which could be expected
  ○ Woodside encouraged Malgana to raise anything which they feel is missing in the information provided during the meeting, or any issues or concerns.		

▪ Malgana stated that the Shark Bay environment is unique and has the largest living organism in the world. It also contains stromatolites and microbial mats which are among the oldest living organisms in the world. Woodside responded that stochastic modelling of the worst case credible spill scenario for the petroleum activity indicates that these receptors would not be contacted. ○ Woodside 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. ▪ Malgana expressed that they are very interested in genuine relationship and partnership building with long term structure. Woodside responded that it is very open to this and looks forward to working together. ○ Woodside described how EMBAs are prepared and their relevance to consultation ▪ Malgana stated that they believe there are flaws in modelling related to Shark Bay hydrodynamics. Woodside responded that nearshore processes may not be very accurate in the model, but it plans for spill response in Shark Bay regardless. Woodside considers the modelling approach robust. ○ Woodside provided an overview of the proposed activity and why it is relevant to Malgana because of the EMBA ○ Woodside 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. ○ Woodside asked whether there were any further questions or feedback on the drilling activities, none were received ○ Woodside provided contact details and invited any further feedback, including NOPSEMA contact details, should Malgana desire to provide feedback directly to the regulator.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**

During face-to-face engagement, Malgana requested further information on topics related to this proposed activity which was responded to during the meeting: • Ability for infrastructure to withstand seismic activity • Spill response arrangements Malgana Aboriginal Corporation indicated that they have particular interest in sea grasses, stromatolites and microbial mats. The Malgana Aboriginal Corporation expressed a desire for ongoing engagement and partnership.	No material issues or concerns related to the proposed activity were raised during consultation to date. Woodside invited further feedback in accordance with Woodside's approach to ongoing consultation (see **Section 7.6**). Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Environmental sensitivities that Malgana noted as having particular interest within Shark Bay are not predicted to be impacted by the worst-case credible scenario, as shown in **Figure 4-11** and **Table 6-17**. 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address Malgana Aboriginal Corporations' functions, interests or activities. Based on the engagement to date, no additional controls have been identified
Nanda Aboriginal Corporation		

Summary of consultation provided and responses:
 	
• On 20 January 2023, Woodside emailed Nanda via the representative body Yamatji Marlpa Aboriginal Corporation (YMAC) regarding another proposed activity
• On 3 February, Nanda emailed Woodside in response to the separate proposed activity, noting:
  ○ Nanda advised that in order to ensure Nanda Aboriginal Corporation is fully informed, and able to engage in meaningful consultation, the Nanda Board proposes the following:
  ▪ Woodside attend a half-day (or full day, if that is Woodside's preference), workshop with Nanda to explain to the Nanda Board the proposed activities and the EP process; and
  ▪ if, after the presentation Nanda Aboriginal Corporation still considers itself a relevant person, provide funds to Nanda Aboriginal Corporation:
  • to engage an expert(s) (such as environmental scientist and/or marine scientist) to advise the Nanda Board about the impact of the proposed activities; and		

- draft an appropriate response for Woodside to include in the EP.
    - Nanda proposed that as next steps it prepares can prepare a budget and look to arrange a date for Woodside to meet with the Board.
    - Nanda noted that this initial meeting does not in itself constitute 'consultation' on the EP as contemplated by the Guide or other applicable law
- On 10 February 2023, Woodside emailed Nanda/YMAC:
    - Woodside advised that it welcomes the opportunity to meet with Nanda to establish a relationship and requested an estimate and Nanda's preferred meeting date(s) at its earliest convenience.
    - Woodside advised it would be pleased to meet at a location that is suitable to Nanda and in funding this meeting would seek to receive some initial feedback from Nanda about their views of the proposed activities.
    - Woodside advised it consider requests to fund independent experts on a case-by-case basis. Woodside notes an expert would need to be agreed by Nanda and Woodside and be an expert in oil and gas environmental management in the marine context.
    - Woodside noted it plans to send Nanda consultation information on a further three EPs shortly for Nanda's consideration and there will be more scheduled over the course of the year. Woodside will be sending separate emails for each of these EPs.
    - Woodside requested that in anticipation of Woodside and Nanda meeting, if there is an opportunity for Woodside to meet with YMAC / Nanda representatives prior to the meeting, so that Woodside can best prepare, it would be most grateful for that opportunity.
- On 7 March 2023, Nanda/YMAC emailed Woodside to advise it would revert back shortly with a cost estimate and proposed dates.
- On 17 March, Woodside emailed Nanda Aboriginal Corporation advising of the proposed activity and provided a Consultation Information Sheet, informing Nanda that they will be covered in the upcoming meeting and inviting feedback.
- On 13 March, Woodside spoke with Nanda/YMAC legal representatives about consultation meeting coordination
- On 17 March 2023, Woodside emailed Nanda/YMAC following up for a date, cost estimate and logistical details for a meeting.
    - Woodside requested on whether a date and budget has been confirmed for a meeting with Nanda and to notify it of additional EPs for consideration by the Nanda Board.
- On 23 March 2023, Nanda/YMAC responded inviting Woodside to meeting the Board of Directors on 19 April in Geraldton. Woodside accepted the invitation.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**

In consultation in the course of preparing the EP since 17 March, Nanda has not provided feedback, objections or claims to date in response to the information provided. Nanda has invited Woodside to discuss the proposed activity with its Board of Directors, which has been arranged.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address Nanda Aboriginal Corporations' functions, interests or activities. Based on the engagement to date, no additional controls have been identified.
Bundi Yamatji Aboriginal Corporation		
Summary of consultation provided and responses: • On 17 March 2023, Woodside emailed BYAC advising of the proposed activity (Appendix F, reference 4.37) and provided a Consultation Information Sheet. • On 17 March 2023, Woodside telephoned BYAC seeking to discuss the information provided and was advised that BYAC would call back • On 30 March 2023, Woodside emailed BYAC following up of the proposed activity (Appendix F, reference 4.44) and proposed to meet to discuss if required. • On 3 April 2023, BYAC emailed Woodside that the activities are not directly within the Yamatji Nation ILUA area. However, BYAC would appreciate being kept informed of progress in relation to the proposed activities.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
In consultation in the course of preparing the EP since 17 March, BYAC has not provided feedback, objections or claims to date in response to the information provided.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 (refer to **Section 7.6**).	Woodside considers the measures and controls in the EP address the Bundi Yamatji Aboriginal Corporation's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.
Yamatji Marlpa Aboriginal Corporation (YMAC)		

Summary of consultation provided and responses:

- On 21 February 2023, Woodside emailed YMAC advising of the proposed activity (Appendix F, reference 3.33) and provided a Consultation Information Sheet.
- On 13 March 2023, Woodside emailed YMAC as to whether YMAC considers itself a 'relevant person' under subregulation 11 A (1) 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.
- On 20 March 2023, YMAC replied to confirm that in its view it is a 'relevant person' under subregulation 11 A (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.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
YMAC has provided feedback that in its view it is a 'relevant person' under subregulation 11 A (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, and does not intend to provide substantive comment on the content of EPs.	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 exist to assist native title claimants and holders. YMAC is identified in the North-west Marine Parks Network Management Plan 2018 (DNP, 2018) as the Native Title Representative Body, noting no marine parks overlap the Operational Area. Woodside has approached YMAC to confirm the best approach to confirm additional cultural values (if any) within the Operational Area. Woodside has consulted with YMAC in relation to its facilitation and coordination function as a Native Title Representative Body under applicable federal legislation. Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received (including any relevant new information on cultural values),	Woodside considers the measures and controls in the EP address YMAC's functions, interests or activities. Based on the engagement to date, no additional controls have been identified.

	it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (refer to **Section 7.6**).	
Historical cultural heritage groups or organisations		
Western Australian Museum		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed WA Museum advising of the proposed activity (Appendix F, reference 3.19) and provided a Consultation Information Sheet. • On 24 February 2023, WA Museum responded, thanking Woodside for their email and confirmed it had no feedback for the proposed EP. • On 9 March 2023, Woodside responded, thanking WA Museum for their response.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	The Western Australian Museum confirmed it has no feedback for 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 7.6**).	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 4.9.2**). While impacts to underwater heritage sites or shipwrecks are possible in the event of an unplanned hydrocarbon spill, Woodside considers it adopts appropriate controls to prevent a hydrocarbon spill and controls to respond in the highly unlikely event of a hydrocarbon spill, as demonstrated in **Section 6.8.2** and **Section 6.8.3.** Woodside considers the measures and controls in the EP address Western

		Australian Museum's functions, interests or activities. No additional EP controls are required.
Local government and community representative groups or organisations		
Shire of Exmouth		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed the Shire of Exmouth advising of the proposed activity (Appendix F, reference 3.20) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed the Shire of Exmouth following up on the proposed activity (Appendix F, reference 4.17) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address the Shire of Exmouth's functions, interests or activities. No additional EP controls are required.
Shire of Ashburton		
Summary of consultation provided and responses: • On 18 February 2023, Woodside emailed Shire of Ashburton advising of the proposed activity (Appendix F, reference 3.27) and provided a Consultation Information Sheet. • On 8 March 2023, Woodside emailed Shire of Ashburton following up on the proposed activity (Appendix F, reference 4.27) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address the Shire of Ashburton's functions, interests or activities. No additional EP controls are required.
City of Karratha		
Summary of consultation provided and responses: • On 17 February 2023, Woodside emailed City of Karratha advising of the proposed activity (Appendix F, reference 3.25) and provided a Consultation Information Sheet. • On 8 March 2023, Woodside emailed City of Karratha following up on the proposed activity (Appendix F, reference 4.26) and provided a Consultation Information Sheet. • On 3 April 2023, City of Karratha responded to Woodside, the City of Karratha has reviewed the referral for comment relating to the Environmental Plan and advised at this stage the City doesn't raise any significant concerns in relation to the aforementioned EP.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Environment Plan Controls**
City of Karratha reviewed the referral for comment and advised it has no significant concerns at this stage. No objections or claims have been received about activity impacts or risks despite follow up.	The City of Karratha confirmed it has no significant concerns relating to the proposed activity at this stage. Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address the City of Karratha's functions, interests or activities. No additional EP controls are required.
Shire of Carnarvon		

Summary of consultation provided and responses:

- On 10 March 2023, Woodside emailed Shire of Carnarvon advising of the proposed activity (Appendix F, reference 4.35) and provided a Consultation Information Sheet.
- On 31 March 2023, Woodside emailed Shire of Carnarvon following up on the proposed activity (Appendix F, 4.40) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address the Shire of Carnarvon's functions, interests or activities. No additional EP controls are required.

Exmouth Community Reference Group (CRG)

- 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

Summary of consultation provided and responses:

- On 16 February 2023, Woodside emailed Exmouth Community Reference Group advising of the proposed activity (Appendix F, reference 3.18) and provided a Consultation Information Sheet.
- On 7 March 2023, Woodside emailed Exmouth Community Reference Group following up on the proposed activity (Appendix F, reference 4.16) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**).	Woodside considers the measures and controls in the EP address the Exmouth

	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 7.6**).	Community Reference Group's functions, interests or activities. No additional EP controls are required.
Karratha Community Liaison Group • 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.*		
Summary of consultation provided and responses: • On 17 February 2023, Woodside emailed Karratha Community Liaison Group advising of the proposed activity (Appendix F, reference 3.24) and provided a Consultation Information Sheet. • On 8 March 2023, Woodside emailed Karratha Community Liaison Group following up on the proposed activity (Appendix F, reference 4.25) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address the Karratha Community Liaison Group's functions, interests or activities. No additional EP controls are required.
Onslow Chamber of Commerce and Industry		
Summary of consultation provided and responses: • On 18 February 2023, Woodside emailed Onslow Chamber of Commerce and Industry advising of the proposed activity (Appendix F, reference 3.26) and provided a Consultation Information Sheet. • On 8 March 2023, Woodside emailed Onslow Chamber of Commerce and Industry following up on the proposed activity (Appendix F, reference 4.28) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address the Onslow Chamber of Commerce and Industry's functions, interests or activities. No additional EP controls are required.
Carnarvon Chamber of Commerce and Industry		

Summary of consultation provided and responses:

- On 10 March 2023, Woodside emailed Carnarvon Chamber of Commerce and Industry advising of the proposed activity (Appendix F, reference 4.34) and provided a Consultation Information Sheet.
- On 31 March 2023, Woodside emailed Carnarvon Chamber of Commerce and Industry following up on the proposed activity (Appendix F, reference 4.39) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address the Carnarvon Chamber of Commerce and Industry's functions, interests or activities. No additional EP controls are required.

Other non-government groups or organisations

350 Australia (350A)

Summary of consultation provided and responses:

- On 16 February 2023, Woodside emailed 350A advising of the proposed activity (Appendix F, reference 3.17) and provided a Consultation Information Sheet.
- On 7 March 2023, Woodside emailed 350A following up on the proposed activity (Appendix F, reference 4.14) 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	Environment Plan Controls

No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address 350A's functions, interests or activities. No additional EP controls are required.
Australian Conservation Foundation (ACF)		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed ACF advising of the proposed activity (Appendix F, reference 3.17) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed ACF following up on the proposed activity (Appendix F, reference 4.14) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address ACF's functions, interests or activities. No additional EP controls are required.
Australian Marine Conservation Society (AMCS)		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed AMCS advising of the proposed activity (Appendix F, reference 3.17) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed AMCS following up on the proposed activity (Appendix F, reference 4.14) 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	Environment Plan Controls
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address AMCS's functions, interests or activities. No additional EP controls are required.
Conservation Council of Western Australia (CCWA)		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed CCWA advising of the proposed activity (Appendix F, reference 3.17) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed CCWA following up on the proposed activity (Appendix F, reference 4.14) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address CCWA's functions, interests or activities. No additional EP controls are required.
Greenpeace Australia Pacific (GAP)		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed GAP advising of the proposed activity (Appendix F, reference 3.17) and provided a Consultation Information Sheet.		

• On 7 March 2023, Woodside emailed GAP following up on the proposed activity (Appendix F, reference 4.14) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address GAP's functions, interests or activities. No additional EP controls are required.
Research institutes and local conservation groups or organisations		
Cape Conservation Group (CCG)		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed CCG advising of the proposed activity (Appendix F, reference 3.17) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed CCG following up on the proposed activity (Appendix F, reference 4.14) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**).	Woodside considers the measures and controls in the EP address CCG's functions, interests or activities. No additional EP 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 7.6**).	
Protect Ningaloo		
Summary of consultation provided and responses: • On 16 February 2023, Woodside emailed Protect Ningaloo advising of the proposed activity (Appendix F, reference 3.17) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed Protect Ningaloo following up on the proposed activity (Appendix F, reference 4.14) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address Protect Ningaloo's functions, interests or activities. No additional EP controls are required.
University of Western Australia (UWA)		
Summary of consultation provided and responses: • On 21 February 2023, Woodside emailed UWA advising of the proposed activity (Appendix F, reference 3.32) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed UWA following up on the proposed activity (Appendix F, reference 4.21) 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**	**Environment Plan Controls**

No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address UWA's functions, interests or activities. No additional EP controls are required.
Western Australian Marine Science Institution (WAMSI)		
Summary of consultation provided and responses: • On 21 February 2023, Woodside emailed WAMSI advising of the proposed activity (Appendix F, reference 3.29) and provided a Consultation Information Sheet. • On 7 March 2023, Woodside emailed WAMSI following up on the proposed activity (Appendix F, reference 4.18) 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**	**Environment Plan Controls**
No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address WAMSI's functions, interests or activities. No additional EP controls are required.
Commonwealth Scientific and Industrial Research Organisation (CSIRO)		
Summary of consultation provided and responses: • On 21 February 2023, Woodside emailed CSIRO advising of the proposed activity (Appendix F, reference 3.31) and provided a Consultation Information Sheet. • On 21 February 2023, CSIRO responded thanking Woodside for their email and confirmed that CSIRO will respond. • On 22 February 2023, CSIRO confirmed that Woodside's email request had been forwarded.		

- On 7 March 2023, Woodside emailed CSIRO following up on the proposed activity (Appendix F, reference 4.20) 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	Environment Plan Controls
CSIRO responded and confirmed that Woodside's email request had been forwarded. No feedback, objections or claims have been received about activity impacts or risks despite follow up.	Woodside has provided a reasonable period in which to receive feedback which is consistent with the intended outcome of consultation (see **Section 5.2**). 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 7.6**).	Woodside considers the measures and controls in the EP address CSIRO's functions, interests or activities. No additional EP controls are required.

Australian Institute of Marine Science (AIMS)

Summary of consultation provided and responses:

- On 21 February 2023, Woodside emailed AIMS advising of the proposed activity (Appendix F, reference 3.30) and provided a Consultation Information Sheet.
- On 7 March 2023, Woodside emailed AIMS following up of the proposed activity (Appendix F, reference 4.19) and to request any feedback.
- On 14 March 2023, AIMS responded thanking Woodside for their email and confirmed that there are no overlaps with planned AIMS science activities in the area.
- On 15 March 2023, Woodside responded, thanking AIMS for their feedback

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Environment Plan Controls
AIMS responded and confirmed that there are no overlaps with planned AIMS science activities in the area.	AIMS responded and confirmed that there are no overlaps with planned AIMS science activities in the area. 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 7.6**).	Woodside considers the measures and controls in the EP address AIMS's functions, interests or activities. No additional EP controls are required.

No objections or claims have been received about activity impacts or risks despite follow up.		

6 ENVIRONMENTAL RISK ASSESSMENT, PERFORMANCE OUTCOMES, STANDARDS AND MEASUREMENT CRITERIA

6.1 Overview

This section presents the impact and risk analysis, evaluation and Environment Performance Outcomes (EPOs), Environmental Performance Standards (EPS) and Measurement Criteria (MC) for the Petroleum Activities Program, using the methodology described in **Section 2** of this EP.

6.2 Impact and Risk Analysis and Evaluation

As required by Regulations 13(5) and 13(6) of the Environment Regulations, the following analysis and evaluation demonstrates that the identified impacts and risks 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. The impact assessment for planned activities has been based on the size of the PAA.

The impacts and risks identified during the ENVID workshops (including decision type, current risk level, acceptability of impacts and risks, and tools used to demonstrate acceptability and ALARP) have been divided into two broad categories:

- Planned activities (routine and non-routine) that have the potential for inherent environmental impacts.
- Unplanned events (accidents, incidents or emergency situations) with an environmental consequence, termed risks.

Within these categories, impact and risk assessment groupings are based on environmental aspects[5] such as emissions and physical presence. In all cases, the worst-case risk was assumed.

The ENVID (performed in accordance with the methodology described in **Section 2**) identified 18 sources of environmental impacts and risks. A summary of the ENVID is provided in **Table 6-1.**

The activity-specific ENVID workshop was conducted on 15 July 2022. Attendees included: Superintendent (Drilling and Completions), Environmental Advisers, Environmental Scientists, Environmental Engineers, Lead Drilling Engineer, Hydrocarbon Spill Adviser, and Environmental Consultants.

The impact and risk analysis and evaluation for the Petroleum Activities Program indicates that all current environmental risks and impacts associated with the individual activities are reduced to ALARP and are of an acceptable level, as discussed further in **Sections 6.7** and **6.8.**

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

Table 6-1: Environmental impact analysis summary of planned and unplanned activities

Aspect	EP Section	Risk Rating				Acceptability of Impact/Risk
		Impact/Consequence	Potential Impact/Consequence Level	Likelihood	Current Risk Rating	
Planned Activities (Routine and Non-routine)						
Routine Light Emissions: External Lighting on MODU and Project Vessels	**6.7.1**	F	Environment – No lasting effect (less than one month); localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine Atmospheric and Greenhouse Gas Emissions	**6.7.2**	F	Environment – No lasting effect (less than one month); localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine Acoustic Emissions: Generation of Noise from MODU, Project Vessels and Positioning Equipment	**6.7.3**	F	Environment – No lasting effect (less than one month); localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine Acoustic Emissions: Generation of Noise from Geophysical and Geotechnical Surveys	**6.7.4**	F	Environment – No lasting effect (less than one month); localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Physical Presence: Interaction with Other Marine Users	**6.7.5**	F	Social and Cultural – no lasting effect (<1 month), localised impact not significant to area/item of cultural significance	-	-	Broadly acceptable
Physical Presence: Disturbance to Benthic Habitat from MODU Anchoring, Drilling Operations, Geotechnical Surveys, Subsea Installation, and ROV Operations	**6.7.6**	E	Environment – Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	-	-	Broadly acceptable

Aspect	EP Section	Risk Rating				Acceptability of Impact/Risk
		Impact/Consequence	Potential Impact/Consequence Level	Likelihood	Current Risk Rating	
Routine and Non-Routine Discharges: MODU and Project Vessels	**6.7.7**	F	Environment – No lasting effect (<1 month); localised impact not significant to environmental receptors (e.g., water quality).	-	-	Broadly acceptable
Routine and Non-Routine Discharges: Drill Cuttings and Drilling Fluids	**6.7.8**	E	Environment – Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	-	-	Broadly acceptable
Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids and Unused Bulk Product	**6.7.9**	E	Environment – Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	-	-	Broadly acceptable
Unplanned Activities (Accidents, Incidents, Emergency Situations)						
Unplanned Hydrocarbon release: Loss of Well Control	**6.8.2**	B	Environment – Major, long term impact (ten to 50 years) on highly valued ecosystems, species, habitat, physical or biological attributes. Reputation/brand – National concern and/or international interest. Medium to long-term impact (five – 20 years) to reputation and brand. Venture and/or asset operations restricted.	1	M	Broadly acceptable
Unplanned Hydrocarbon release: Vessel Collision	**6.8.3**	D	Environment – Minor, short-term impact (one to two years) on species, habitat (but not affecting ecosystems), physical or biological attributes.	1	M	Broadly acceptable

Aspect	EP Section	Risk Rating				Acceptability of Impact/Risk
		Impact/Consequence	Potential Impact/Consequence Level	Likelihood	Current Risk Rating	
Unplanned Hydrocarbon release: Bunkering	**6.8.4**	E	Environment – Slight, short term local impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	1	L	Broadly acceptable
Unplanned Discharges: Deck and Subsea Spills	**6.8.5**	E	Environment – Slight, short term local impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	2	L	Broadly acceptable
Unplanned Discharges: Hazardous and Non-Hazardous Solid Wastes/Equipment	**6.8.6**	F	Environment – No lasting effect (<1 month); localised impact not significant to environmental receptors (e.g., water quality).	2	L	Broadly acceptable
Physical Presence (Unplanned): Seabed Disturbance from Dropped Objects and Anchor Drag	**6.8.7**	D	Environment – Minor, short-term impact (one to two years) on species, habitat (but not affecting ecosystems), physical or biological attributes.	1	L	Broadly acceptable
Physical Presence (Unplanned): Collision with Marine Fauna	**6.8.8**	E	Environment – Slight, short term local impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	1	L	Broadly acceptable

Aspect	EP Section	Risk Rating				Acceptability of Impact/Risk
		Impact/Consequence	Potential Impact/Consequence Level	Likelihood	Current Risk Rating	
Physical presence: Accidental Introduction of Invasive Marine Species	**6.8.9**	E	Environment – Slight, short term local impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes. Reputation and Brand – Minor, short-term impact (one to two years) to reputation and brand. Close scrutiny of asset level operations or future proposals.	0	L	Broadly acceptable

6.3 Environmental Performance Outcomes, Standards and Measurement Criteria

Regulation 13(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 **Section 2.7.2** 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 7.8)**.

6.4 Presentation

The environmental impact and risk analysis and evaluation (ALARP and acceptability), EPOs, standards and MC are presented in the following tabular form throughout this section. Italicised text in the following example denotes the purpose of each part of the table with reference to the relevant sections of the Environment Regulations and/or this EP.

<table>
<tr><td colspan="13">Context
Description of the context for the impact/risk. Regulation 13(1, 13(2) and 13(3)</td></tr>
<tr><td>Description of the Activity – Regulation 13(1)</td><td colspan="5">Description of the Environment – Regulations 13(2)(3)</td><td colspan="7">Consultation – Regulation 11A</td></tr>
<tr><td colspan="13">Impact and Risk Evaluation Summary
Summary of ENVID outcomes</td></tr>
<tr><td rowspan="2">Source of Risk
Regulation 13(1)</td><td colspan="6">Environmental Value Potentially Impacted
Regulations 13(2)(3)</td><td colspan="7">Evaluation
Section x</td></tr>
<tr><td>Marine Sediment</td><td>Water Quality</td><td>Air Quality (incl Odour)</td><td>Ecosystems/ Habitat</td><td>Species</td><td>Socio-economic</td><td>Decision Type</td><td>Consequence/Impact</td><td>Likelihood</td><td>Risk Rating</td><td>ALARP Tools</td><td>Acceptability</td><td></td></tr>
<tr><td>Summary of source of risk/ impact</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="13">Description of Source of Risk or Impact</td></tr>
<tr><td colspan="13">Description of the identified risk/impact including sources or threats that may lead to the impact/risk or identified event. Regulation 13(1).</td></tr>
<tr><td colspan="13">Impact or Consequence Assessment</td></tr>
<tr><td colspan="13">Environmental Value/s Potentially Impacted</td></tr>
</table>

Discussion and assessment of the potential impacts to the identified environment value/s. Regulation 13(5) and 13(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)[6]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
ALARP/Hierarchy of Control Tools Used – Section 2				
Summary of control considered to ensure the impacts and risks are continuously reduced to ALARP. *Regulation 13(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.*
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***) and a proportionality assessment. Regulation 10A (b).				

Demonstration of Acceptability
Acceptability Statement Made on the basis of applying the process described in **Section *2*** and **Section *2*** taking into account internal and external expectations, risk/impact to environmental thresholds and use of environment decision principles. Regulation 10A(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.*	**C No.** *Identified control adopted to ensure that the impacts and risks are continuously reduced to ALARP.* *Regulation 13(5) (c).*	**PS No.** *Statement of the performance required of a control measure. Regulation 13(7)(a).*	**MC No.** *Measurement criteria for determining whether the outcomes and standards have been met. Regulation 13(7)(c).*

[6] Qualitative measure

EPOs, EPSs and MC			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
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*[7] **T***: The outcome will state the timeframe during which the outcome will apply or by which it will be achieved.*			

6.5 Cumulative Impacts

Woodside has assessed the cumulative impacts of the Petroleum Activities Program in relation to other relevant development activities which could potentially result in overlapping temporal and spatial extents. In particular, IMR work at the nearby JUL-A production manifold may occur while the Petroleum Activities Program is underway. Similarly, the decommissioning phase of the Julimar South-1 well may occur concurrently to work completed under the Julimar Development Phase 3 (JDP3). Additionally, where relevant the cumulative impacts of activities associated with undertaking multiple concurrent or parallel activities associated with this Petroleum Activities Program have been assessed for cumulative impacts as relevant. Cumulative impacts are addressed where relevant in **Sections 6.7**, and **6.8**.

Given that unplanned activities are not intended to occur during the life of the infrastructure, no reasonable estimate of the frequency, intensity or duration of such activities can be made. If these activities are undertaken, they will be discrete events and any impacts will be localised. As such, Woodside has reasonably assessed unplanned events are not credible, with no consideration of cumulative impacts of repeated unplanned events from the Petroleum Activities Program or compounding impacts from other petroleum facilities within the region.

6.6 Potential Environment Risks Not Included Within the Scope of this Environment Plan

The ENVID identified environmental risks that were assessed as not being applicable within or outside the PAA as a result of the Petroleum Activities Program and, therefore, were determined to not form part of this EP. These are described in the next sections for information only.

6.6.1 Shallow/Near-shore Activities

The Petroleum Activities Program is located in water depths greater than 80 m and at a distance of about 54 km to the nearest landfall (Montebello Islands). Consequently, risks associated with

[7] 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**).

shallow/ near-shore activities such as vessel anchoring, and risks of grounding were assessed as not credible.

6.6.2 Underwater Noise Emissions from Helicopters and ROV

It is not credible that airborne noise from helicopter transfers would add to levels of underwater noise emanating from the MODU, project vessels and positioning equipment. Similarly, it is not credible that noise from ROV operations at the seabed in 83 – 258 m water depth would add to levels of noise emanating from the MODU and project vessels just below the sea surface, or noise emissions from transponders on the seabed. Noise emissions from these other sources are not anticipated to cumulative sound fields from MODU, project vessel and transponders to any discernible extent. As such noise emissions from these sources has not been considered in **Section 6.7.3**.

6.6.3 Loss of Containment from Existing Subsea Infrastructure

As described in **Section 4.9.8**, existing subsea infrastructure is present in the PAA as part of the Julimar Field Production Systems. A subsea loss of containment from a rupture of live infrastructure within the PAA could occur, in the event of a significant dropped object. A worst-case credible hydrocarbon release scenario has been defined in the Julimar Operations EP as a short-term (5.2 hrs) subsea release of 1062 m^3 of Brunello Condensate from a full-bore rupture at the JDP2 flowline inlet, representing worst-case loss of containment when the isolation between the Brunello and Julimar Production Flowlines is open and the inventory from three separate flowlines is released at once. The in force Julimar Operations EP provides a description and assessment of impacts and risks. Management controls and response capabilities are detailed in that EP (NOPSEMA Doc: A771970).

The Chevron operated Wheatstone trunkline is approximately 4km from the PAA. In the event of a subsea loss of containment from a rupture of this live infrastructure (from anchor drag), the worst-case credible hydrocarbon release scenario has been defined in Chevron's Wheatstone Project Start-Up and Operations EP as a short-term (7.2 hrs) subsea release of 3,710m^3 of Jansz Condensate from a full-bore rupture (FBR) in the middle trunkline, representing worst-case loss of containment along the trunkline as hydrocarbons from upstream and downstream of the rupture location would feed a middle trunkline FBR. The in-force Wheatstone Project Start-Up and Operations EP provides a description and assessment of impacts and risks. Management controls and response capabilities are again detailed in that EP (NOPSEMA Doc: A853704).

Additional controls for operating the MODU/WIV/MOU are provided throughout **Section 6.7** and **6.8**. In particular, controls are included for the prevention of dropped objects (**Section 6.8.7**).

6.6.4 Indirect Impacts

For the PAP, the potential 'indirect' environmental impacts and risks evaluated are those associated with mobilisation/demobilisation of the MODU/vessels to the Operational Area, which have been considered in the environmental impact assessment in **Section 6.6** and **Section 6.7**.

Due to the nature and scale of these potential indirect environmental impacts and risks (such as fuel usage, interaction with other marine users and usual vessel discharges), and the regulatory frameworks and applicable maritime regulations in place to manage them, Woodside considers the potential impacts and risks from mobilisation and demobilisation of the MODU and vessels to be inherently ALARP in its current state. Therefore, Woodside considers that standard vessel and MODU operations are appropriate to manage the potential impacts and risks from mobilisation and demobilisation of the WIV and support vessels to a level that is acceptable.

6.7 Planned Activities (Routine and Non-Routine)

6.7.1 Routine Light Emissions: External Lighting on MODU and Project Vessels

Context		
Relevant Activities Project Vessels – **Section 3.9**	**Existing Environment** Marine Regional Characteristics – **Section 4.2** Protected Species – **Section 4.6**	**Consultation** 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*
External light emissions on board MODU and project vessels					X		A	F	-	-	GP	Broadly Acceptable	EPO 1

Description of Source of Impact

Project Vessel Operations

It is intended that 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 and 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 about 30 km from vessels (Woodside, 2014).

Whilst the line of sight may extend tens of kilometres from the source, the light density (measured in Lux – which represents the intensity of light that arrives at or leaves a surface, as perceived by the human eye) rapidly decreases as distance increases from the source of the light. Monitoring undertaken as a part of Woodside's 2014 study indicated that light density (from navigational lighting) attenuated to below 1.00 Lux and 0.03 Lux at distances of 300 m and 1.4 km, respectively, from the source (a MODU). Light densities of 1.00 and 0.03 Lux are comparable to natural light densities experienced during deep twilight and during a quarter moon. Navigational lighting from vessels is less than lighting on a MODU. Therefore, light emissions from the MODU and project vessels are expected to be below 1.00 Lux within 300 m from the source.

Cumulative light sources

Cumulative light impacts have the potential to occur from IMR activities on the nearby JUL-A production manifold or decommissioning activities may also coincide with other project activities, which may result in slightly elevated ambient light levels. Activities conducted on the JUL-A production manifold are likely to consist of one project vessel and are not expected to significantly increase impacts to marine fauna. Whilst the number of vessels that may be utilised for JDP3 is yet to be determined, the wellhead removal scope is likely to consist of two project vessels, operating for a short duration (approximately 2 days), to be undertaken within three years of completion of the drilling activities. In this case, impacts to marine fauna are likely to be minor and temporary in nature.

Impact Assessment

Potential impacts to environmental values

Receptors that have important habitat within a 20 km buffer of the PAA were considered for the impact assessment, 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, demonstrated to occur at 15–18 km, and fledgling seabirds grounded in response to artificial light 15 km away (Commonwealth of Australia, 2020).

Light emissions have the potential to 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 night time 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: Species such as marine turtles and birds may also 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 fauna within the PAA are predominantly pelagic fish and zooplankton, with a low abundance of transient species such as marine turtles, whale sharks, whales and migratory seabirds. Given the low abundance of fauna expected to occur within the PAA, impacts from light emissions are considered to be highly unlikely. As outlined below, internesting adult female turtles are not impacted by artificial light emissions, and it is more relevant to consider separation distances between light sources and nesting habitat critical for turtles — the nesting locations as identified in Table 6 of the Marine Turtle Recovery Plan (Commonwealth of Australia, 2017).

The PAA is about 50 km offshore (from North-west Island) and overlaps with internesting buffer habitat critical for the survival of the species' for flatback turtles, and BIAs for flatback turtle internesting, whale shark foraging, and wedge-tailed shearwater breeding and foraging. (**Section 4.6**).

Seabirds

Artificial lighting has the potential to 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 (e.g. Longcore and Rich, 2004; Gaston et al., 2014; Rich and Longcore, 2006). As the PAA is offshore and away from islands or other emergent features, any presence of seabirds or shorebirds is considered likely to be of a transient nature only. A breeding and foraging BIA for the wedge-tailed shearwater overlaps the PAA. The nearest emergent land that could be used for roosting or nesting habitat is the Montebello Islands (about 50 km from the PAA).

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 about 50 km from the nearest emergent land, impacts to adult nesting or fledgling seabirds and migratory shorebirds are not expected. 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.

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 (Department of Environment, 2015). The risk associated with collision from seabirds and shorebirds attracted to the light is considered to be low, based on the intermittent and localised nature of the activities in the PAA, as well as the distance offshore. Impacts are expected to be limited to temporary behavioural disturbance to isolated individuals, and is not expected to disrupt important migration patterns of migratory seabirds.

Foraging adult seabirds may occur within the PAA. Foraging adult seabirds, including shearwaters, are less susceptible to impacts from artificial light than fledglings or nesting adult seabirds. However, they are still vulnerable as artificial light can interact with offshore foraging behaviour which may occur during the day or night.

Foraging adult wedge-tailed shearwaters may be attracted to sources of light emissions to feed on fish drawn to the light, or may be attracted to vessel light during periods of low visibility (Catry et al., 2009; Whittow 1997). During the breeding period at the Muiron Islands off Exmouth Gulf (from around August to April, peak November), adult wedge-tailed shearwaters were observed taking a combination of short (1–4 days) or long (6–30 days) foraging trips from the Muiron Islands, travelling over large areas across the north west of Australia towards Indonesia (Cannell et al., 2019). During the breeding period, foraging adult wedge-tailed shearwaters were observed travelling up to around 1000 km from the breeding colony (Cannell et al., 2019). Although the breeding and foraging BIA overlapping the PAA is defined as the area within around 70-80 km from the Montebello Islands, wedge-tailed shearwaters on the NWS have been observed foraging beyond the breeding and foraging BIA. Based on the large area where foraging is known to occur, the PAA does not represent a significant portion of the known foraging area for the wedge-tailed shearwaters. Therefore, impacts to wedge-tailed shearwaters are likely to be limited to localised behavioural

disturbance to isolated transient individuals. Artificial lighting from the Petroleum Activities Program is not expected to significantly impact foraging or displace seabird species from important foraging 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 nearest turtle nesting locations to the PAA are at Montebello Islands, about 50 km south-east of the PAA, for flatback, green and loggerhead hawksbill turtles. The distance between the most significant light source on the MODU (derrick and the edge of visibility, or the visible horizon, was calculated using a manual calculation that takes atmospheric refraction into consideration (Young's method) as expressed by the formula $d = 3.86\sqrt{h}$, where 'd' is the distance to the visible horizon, and 'h' is the light source height in metres.

For a derrick height of 50 m (maximum likely for potential MODUs that could be contracted for the Petroleum Activities Program), the distance to the visible horizon is ~27 km – i.e. anything beyond this distance is below the horizon and direct light would not be visible. Therefore, direct light from project vessels/MODU will not reach any nesting location, but there is the potential for sky glow (particularly from flaring rather than operational lighting) to be visible at the closest nesting locations.

Whilst sky glow from flaring may be visible at the closest nesting beaches in the Montebello Islands (~50 km from the PAA), it is not credible that it would result in any behavioural impact (i.e. not biologically relevant). The light source is located directly offshore in the same direction that emerging hatchlings would be heading in anyway during normal sea-finding behaviour, meaning that no significant misorientation or disorientation would occur.

Since the PAA is located ~50 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 project vessels/MODU is not considered credible. This is supported by the findings of a desktop lighting impact assessment for the Scarborough Project, conducted by Pendoley Environmental (PENV, 2020). 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. For any isolated individuals potentially attracted to light spill from project vessels/MODU, following sunrise, any effect of these light sources on hatchlings will be eliminated allowing dispersal behaviour to resume.

Any impacts to hatchling turtles from artificial light will be limited to possible localised behavioural impacts to isolated individual hatchlings offshore, with no lasting effect to the species.

Marine Turtles – 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 & Witherington, 1995). However, such lighting is typically from residential and industrial development overlapping the coastline, rather than offshore from nesting beaches. While the PAA overlaps with the north-west extent of a BIA and habitat critical to the survival of flatback turtles for internesting (described in **Section 4.6.2**), the nearest landfall for this BIA occurs at North West Island of the Montebello Islands, about 50 km south-east of the PAA.

The BIA and habitat critical to the survival of flatback turtles are considered very conservative as they are based on the maximum range of internesting females and many turtles are more likely to remain near their nesting beaches. Impacts to nesting turtles are therefore not expected. Internesting flatback turtles favour depths of < 25 m, and foraging flatback turtles predominantely occur in waters shallower than 130 m (Whittock et al., 2016a, 2016b). Given the water depth of the PAA (83-258 m), turtles are unlikely to be foraging. However, it is acknowledged that marine turtles may be present transiting the PAA in low densities.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, light emissions will not result in an impact greater than localised and temporary disturbance to marine fauna (seabirds, migratory shorebirds and marine turtles), with no lasting effect (i.e. Environment Impact – F).

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[8]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
No additional controls identified				
Good Practice				
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 1.1**
Implement a Seabird Management Plan that includes: • Standardisation and maintenance of record keeping and reporting of seabird interactions • Procedures on seabird intervention, care and management • Regulatory reporting requirements for seabirds (unintentional death of or injury to seabirds that constitute MNES) • A scalable adaptive management process should negative light impacts to nocturnal seabirds be detected	F: Yes. The Seabird Management Plan is an internal Woodside process developed to manage the impacts of artificial light emissions. CS: Minimal cost/sacrifice.	Implementing a Seabird Management Plan allows for standardised data collection to better understand seabird interactions with project vessels, provide guidance on seabird management for the best outcome for grounded birds and facilitate escalation and adoption of management actions within 24 hrs, preferably before next nightfall, should triggers be met.	While the control does not result in significant reduction of impacts, it is good practice and not at significant cost.	Yes **C 1.2**
Professional Judgement – Eliminate				
Substitute external lighting with ‘‘turtle friendly’’ light sources (reduced emissions in turtle visible spectrum).	F: Yes. Replacement of external lighting with turtle friendly lighting is technically feasible, although is not	Given the potential impacts to turtles during this activity is insignificant, implementation of this control would not result in a reduction in consequence.	Grossly disproportionate. Implementation of the control requires considerable cost sacrifice and provides minimal	No

[8] Qualitative measure

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[8]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	considered to be practicable. CS: Significant cost sacrifice. The retrofitting of external lighting on the MODU and vessels, etc., would result in considerable cost and time expenditure. Considerable logistical effort to source sufficient inventory of the range of light types onboard the MODU.		environmental benefit. The costs/sacrifices outweigh the benefit gained.	
Variation of the timing of the Petroleum Activities Program 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
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 acoustic light. 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 MODU and project vessels may result in localised and temporary behavioural disturbance to species within the PAA, with no lasting effect (<1 month). BIAs within the PAA include the flatback turtle internesting, whale shark foraging, pygmy blue whale migration and distribution, and wedge-tailed shearwater breeding and foraging areas. Regard has been given to relevant conservation advice and wildlife conservation plans during the assessment of potential impacts and the NLPG were taken into consideration during the impact evaluation. 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 6.8**). 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 light emissions to a level that is broadly acceptable.				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 1 No impact to protected fauna greater than a consequence level of F[9] from artificial light emissions during the Petroleum Activities Program	**C 1.1** Lighting will be limited to the minimum required for navigational and safety requirements, with the exception of emergency events.	**PS 1.1** Lighting will be limited to that required for safe work/navigation.	**MS 1.1.1** Inspection verifies no excessive light being used beyond that required for safe work/ navigation.
	C 1.2 Implement a Seabird Management Plan that includes: • Standardisation and maintenance of record keeping and reporting of seabird interactions • Procedures on seabird intervention, care and management • Regulatory reporting requirements for seabirds (unintentional death of or injury to seabirds that constitute MNES) • A scalable adaptive management process should negative light impacts to nocturnal seabirds be detected	**PS 1.2.1** Implementation of the Woodside Offshore Seabird Management Plan by MODU and key PAP vessels to minimise potential impact should nocturnal seabird groundings occur.	**MS 1.2.1** Records demonstrate the Woodside Offshore Seabird Management Plan is implemented.

[9] *Defined as 'No lasting effect (less than one month); localised impact not significant to environmental receptors.as in* ***Table 2-3/ Section 2.6.3.***

6.7.2 Routine Atmospheric and Greenhouse Gas Emissions

Context		
Relevant Activities Drilling Activities – **Section 3.6** Project vessels and Support Activities – **Section 3.9** Contingent Activities – **Section 3.10**	**Existing Environment** Socioeconomic Environment – **Section 4.9**	**Consultation** 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***
Exhaust emissions from internal combustion engines and incinerators on project vessels and helicopters			X				A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 2
Contingent venting of gas during drilling (e.g well kick)			X										

Description of Source of Impact

Atmospheric emissions assessed in this EP have been classified into two categories:

- Atmospheric pollutants (non-greenhouse gas emissions) are gases and particulates from an activity, or piece of machinery, which have a recognised adverse effect on human health and/or flora and fauna. The main emissions responsible for these effects include carbon monoxide (CO), oxides of nitrogen (NOx), sulphur dioxide (SO2), particulate matter less than 10 microns (PM10), non-methane volatile organic compounds (VOCs), BTEX (benzene, toluene, ethylbenzene and xylenes), which are specific VOCs of interest
- Greenhouse gas (GHG) emissions are those gasses within the atmosphere that absorb long-wave radiation, and thus trap heat reflected from the Earth's surface. The main gases responsible for this effect include carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Other greenhouse gases include perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF6).

MODU, Vessel and Helicopter Operations

Atmospheric emissions 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 SOx, NOx, particulates and VOCs. SOx and particulate matter emissions are heavily influenced by the fuel used and its relative sulphur content, MGO usually having a lower sulphite content than marine diesel oil (MDO) or heavy fuel oil (HFO).

A moored MODU will be used for the drilling, appraisal and plug and abandonment campaign resulting in less fuel needed for station keeping. Dynamic positioning will only be used in the event of adverse weather conditions etc. Other vessels required for the Petroleum Activities Program (e.g. survey vessel, WIV/MOU/other decommissioning vessel) may use DP to conduct 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 Dynamically Positioned Vessel such as the proposed WIV will consume less than 50t/d when compared to similar scenarios. Based on the information available it is expected that up to about 2500 tonnes of fuel may be used over the ~50 days from MODU activities (drilling, appraisal and plug and abandonment activities).

Decommissioning activities will occur within three years from completion of drilling activities and will be ongoing for approximately 2 days.

There is the potential for up to two support vessels to operate out of Karratha supporting the Petroleum Activities Program, although emissions produced will be substantially less than that of the MODU or decommissioning vessel. Given that expected operation for drilling, appraisal, plug and abandonment and wellhead decommissioning activities in the PAA is expected to be approximately 52 days in total and using an estimated fuel use of 5 t/d for support vessels (Energy Institute 2000), it is expected that approximately 520 tonnes of fuel would be consumed in this time. Using an estimated fuel use of 600 L/r (Energy Institute 2000) and applying aviation fuel emissions factor from NGER. The potential for multiple helicopter runs has been considered in greenhouse gas summations. The total expected GHG emissions from MODU, vessel and helicopter activity are presented in **Table 6-2**.

Survey vessels are expected to use approximately 7t/d of fuel, over an expected 45 days. This activity may occur within the life of the EP.

Well Kick

During drilling of the well, 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. This volume is approximately 60bbl of gas release.

Table 6-2: GHG emissions and sources

Source	GHG Emissions released (CO2-e t)
MODU Activities	
MODU Operations (50 days)	~ 5,950
2 x Support vessel Operations (50 days)	~1,363
Helicopter operations	~140
Well kick - Drilling Ops (60bbl Cold vent)	~0.5
Geophysical/Geotechnical Operations	
Survey Vessel Operations (45 days)	~858
Decommissioning	
Decommissioning vessel operations (2 days)	~238
2 x Support vessel Operations (2 days)	~109
Total GHG Emissions	**~8,659**

Impact Assessment

Potential impacts to environmental values

Air Quality (atmospheric pollutants)

Atmospheric emissions may result in a decline in local air quality, within the immediate vicinity of the emissions source. As described above, produced emissions throughout the project will include SO_2, NOx, ozone depleting

substances, CO_2, particulates and VOCs. Emissions from engines, generators and deck equipment may be toxic, odoriferous or aesthetically unpleasing, and will result in a reduction in air quality.

Given the offshore location of the PAA, and the low volumes of atmospheric emission which will be generated, biodiversity, ecological integrity, social amenities and human health will not be impacted and any potential impact to air quality is slight.

Aesthetic Value

Atmospheric emissions have the potential to introduce odour and visual amenity issues which can result in changes to the aesthetic value of an area.

Given the distance from shore of the PAA (~50 km) and the short duration of the activities, the potential for a change in air quality from atmospheric emissions resulting in a change to aesthetic value for tourism/recreation or settlements is not considered to be credible. Therefore, a change in aesthetic value from atmospheric emissions associated with Petroleum Activities Program is negligible.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that routine atmospheric and GHG emissions will not result in a potential impact greater than no lasting effect (Consequence F) based on a localised effect to air quality of the regional airshed.

Demonstration of ALARP

Control Considered	Control Feasibility (F) and Cost/Sacrifice (CS)[10]	Benefit in Impact/Risk Reduction	Proportionality	Control Adopted
Legislation, Codes and Standards				
Marine Order 97 (Marine pollution prevention – Air pollution).	F: Yes CS: Minimal cost. Standard practice	Legislative requirements to be followed may slightly reduce the likelihood of air pollution.	Control based on legislative requirements – must be adopted.	Yes **C 2.1**
Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011: Accepted Well Operations Management Plan (WOMP) and application to drill.	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 2.2**
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 2.3**
Subsea BOP installed and tested during drilling operations.	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 2.4**
Process conducted to calculate, update and monitor kick tolerance for use in well design and while drilling.	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 2.5**

Well control bridging document (WCBD) for alignment of Woodside and the MODU Contractor in order to manage the equipment and procedures for preventing and handling a well kick.	F: Yes CS: Standard practice. Required by Woodside standards.	Implementing equipment and procedures in the well control bridging document will reduce the volume of gas vented in the event of a well kick.	Benefits outweigh cost/sacrifice	Yes **C 2.6**
Reporting of GHG emissions as required by regulatory requirements	F: Yes CS: Standard practice. Required by Woodside standards.	Tracking and reporting of emissions gives visibility to performance and enables improvement opportunities to be identified. Reporting increases transparency and accountability which can also drive performance improvements.	Control based on legislative requirements – must be adopted	Yes **C 2.7**
Good Practice				
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 1.3**
Professional Judgement – Eliminate				
Do not combust fuel	F: No. There are no MODUs or vessels that do not use internal combustion engines. CS: Not considered – control not feasible.	Not considered – control not feasible.	Not considered – control not feasible.	No
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 – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
Manage support vessels speed to reduce fuel combustion	F: Yes CS: Standard practice	Reducing fuel combustion reduces atmospheric emissions.	Benefits outweigh cost/sacrifice	Yes **C 2.8**
ALARP Statement On the basis of the environmental impact assessment outcomes and use of the relevant tools appropriate to the decision type (i.e. Decision Type A, **Section 2.7.1).** Woodside considers the adopted controls good oil-field practice, and appropriate to manage the impacts of fuel combustion, incineration and venting. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts are considered ALARP.				
Demonstration of Acceptability				
Acceptability Statement				

The impact assessment has determined that, given the adopted controls, routine atmospheric emissions from fuel combustion, incineration, and venting are unlikely to result in an impact significance greater than negligible. The adopted controls are considered consistent with industry legislation, codes and standards, and professional judgement and meet the requirements of Australian Marine Orders.

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 atmospheric emissions to a level that is broadly acceptable.

Environmental Performance Outcomes, Standards and Measurement Criteria

Outcomes	*Controls*	*Standards*	*Measurement Criteria*
EPO 2 Undertake the Petroleum Activities Program in a manner that will not result in a substantial change in air quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	**C 2.1** Marine Order 97 (Marine Pollution Prevention – Air Pollution) which detail requirements for: • International Air Pollution Prevention (IAPP) Certificate, required by vessel class • use of low sulphur fuel when available • Ship Energy Efficiency Management Plan (SEEMP), where required by vessel class • onboard incinerator complies with Marine Order 97.	**PS 2.1** MODU and project vessels compliant with Marine Order 97 (Marine Pollution Prevention – Air Pollution) to restrict emissions to those necessary to perform the activity. Vessel marine assurance process conducted prior to contracting vessels, to ensure suitability and compliance with vessel combustion certification/marine order requirements.	**MC 2.1.1** Marine Assurance inspection records demonstrate compliance with Marine Order 97.
	C 2.2 Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011: accepted Well Operations Management Plan (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	**PS 2.2.1** Well drilled in compliance with the accepted WOMP, including implementation of barriers to prevent a loss of well integrity.	**MC 2.2.1** Acceptance letter from NOPSEMA demonstrates the WOMP and application to drill were accepted by NOPSEMA prior to the drilling activity commencing. **MC 2.2.2** Records demonstrate minimum of two verified barriers (a single fluid barrier may be implemented during the initial stages of well construction if appropriateness is confirmed by a shallow hazard study) were in place for all permeable zones penetrated by the wellbore. **MC 2.2.3** Records demonstrate composition and weight of drilling fluids were

	confirmed by a shallow hazard study) • discrete hydrocarbon zones shall be isolated from each other (to prevent cross flow) by a minimum of one barrier where deemed required • all normally pressured permeable water-bearing formations shall be isolated from the surface by a minimum of one barrier. The barriers shall: • be effective over the lifetime of well construction • (fluid barriers) remain monitored and provide sufficient pressure to counter pore pressure during well construction • (cementing barriers, including conductor, casing and liners) conform to the relevant minimum standards set out in the Woodside Engineering Standard – Well Cementation. Verification: • effectiveness of primary and secondary barriers shall be verified (physical evidence of the correct placement and performance) during the drilling of the well.		applicable to down hole conditions.
	C 2.3 As-built checks shall be completed during well operations to establish a minimum acceptable standard of well integrity is achieved.	**PS 2.3.1** Achieve a minimum acceptable standard of well integrity.	**MC 2.3.1** Records show Well Acceptance criteria are developed for the well.
	C 2.4 Subsea BOP installed and tested during drilling operations. The BOP shall include: • one annular preventer	**PS 2.4.1** Subsea BOP specification, installation and testing compliant with internal Woodside Standards and international requirements (API Standard 53 5th Edition) as agreed by Woodside and MODU contractor.	**MC 2.4.1** Records demonstrate that BOP and BOP control system specifications and testing were in accordance with minimum standards for the expected drilling conditions as

	• 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.		agreed by Woodside and MODU contractor.
	C 2.5 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 a management of change (MOC). • The manual also includes requirements for kick tolerance management in the event of down-hole losses.	**PS 2.5.1** Kick tolerance is calculated, managed, monitored and updated while drilling.	**MC 2.5.1** Records demonstrates well kick tolerance is calculated, managed, monitored and updated while drilling.

	• C 2.6 • 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 2.6.1** 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 2.6.1** Records demonstrate well drilled in accordance with WCBD.
	C 2.7 Reporting of GHG emissions as required by regulatory requirements	**PS 2.7.1** GHG emission regulatory reporting undertaken as required	**MC 2.7.1** Records demonstrate required regulatory GHG emission reported
	C 1.3 **Refer Section 6.7.1**	**PS 1.3** **Refer Section 6.7.1**	**MS 1.3.1** **Refer Section 6.7.1**
	C 2.8 Manage support vessel speed to reduce fuel combustion	**PS 2.8.1** Support vessel speeds will be managed to reduce fuel consumption where practicable.	**MC 2.8.1** Records demonstrate speed of support vessels managed

6.7.3 Routine Acoustic Emissions – Generation of Noise from MODU, Project Vessels

Context		
Relevant Activities Project Vessels and Support Activities – **Section 3.9** Drilling Activities – **Section 3.6** Contingent Activities – **Section 3.10**	**Existing Environment** Regional context – **Section 4.2** Protected Species – **Section 4.6** Socio-economic Environment – **Section 4.9**	**Consultation** 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, survey, decommissioning (MOU or WIV), AHVs and support vessels) during normal operations					X		A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 3
Generation of acoustic signals from DP systems on project vessels (MOU, WIV, AHV and geophysical survey vessels)					X		A	F	-	-			
Generation of noise from suction piling, cutting of well infrastructure and contingency activities					X		A	F	-	-			

Description of Source of Impact

Vessel noise

A range of project vessels may be utilised between the drilling program (moored MODU; **Sections 3.6**), survey program (general purpose survey vessel, AHV; **Section 3.8**) and decommissioning of the Julimar South-1 well (MOU, WIV or subsea support (IMR) vessel; **Section 3.7**). Additional general support/supply vessels will be present during drilling and decommissioning activities (**Section 3.9**), and an AHV will also be utilised to lay MODU moorings (**Section 3.9.5**

The project vessels will generate noise both in the air and underwater, due to the operation of thrusters, engines, propeller movement, etc. Vessels, including the AHV, general support vessels, decommissioning vessel (MOU, WIV or subsea support (IMR) vessel) and survey vessels, will use Dynamic Positioning (DP) where propellers and thrusters are used to hold position, rather than anchoring. These noise sources will contribute to and have the potential to

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 1µPa (rms SPL) under windy conditions (McCauley, 2005).

MODU Drilling Operations (moored)

During drilling operations, the MODU will produce low-intensity continuous sound. Sound produced from an active MODU is predominantly below 2 kHz, with peak frequencies below 500 Hz. Measured frequencies for the West Aquarius MODU, which is considered to be representative of drilling by the MODU that will be contracted for the Julimar South-1 drilling activity, recorded a peak frequency at 190 Hz (Martin et al., 2019).

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 MODU, which is similar in specification to the MODU that is currently considered for the drilling campaign. The Ocean Onyx MODU was measured to have a broadband (10 Hz to 31 kHz) source level of 175.4 dB re 1 µPa m whilst anchored and drilling. This source level is considered representative of the drilling activity for this EP and was used as one of the source inputs to inform sound transmission loss modelling commissioned by Woodside and conducted by JASCO (Stroot et al., 2022) to inform the underwater noise impact assessment. The measured source level for the Ocean Onyx is consistent with or slightly higher than levels recorded for other moored MODUs during drilling operations. For example, McCauley (1998) recorded source noise levels for moored MODUs from 149-154 dB re 1 µPa at 1 m while actively drilling (with support vessel on anchor) and Greene (1987) recorded source levels of two moored drillships from 145-158 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.

The MODU is expected to be on location for approximately 50 days during drilling, appraisal and plug and abandonment activities.

Project Vessels and Operation of DP

Vessels used for the Petroleum Activities Program are detailed in **Section 3.9**, and include a number of 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 50-100 m size class (e.g. supply ships, crew boats, research vessels) produce broadband source levels in the 165–180 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 1µPa (Richardson et al., 1995). McCauley (1998) measured underwater broadband noise equivalent to about 182 dB re 1 µPa at 1 m (RMS 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 this Petroleum Activities Program.

Indicative vessel noise for an offshore supply vessel (OSV) was modelled for this EP as outlined below. Sound source levels for the OSV were taken by JASCO from the Fugro Etive (Stroot et al., 2022). For the MODU resupply scenarios modelled, total broadband source levels for these thrusters (combined single source) are 187.6 dB re 1 μPa^2m^2. For the OSV on standby scenario while slowly transiting, the total broadband source level was 177.8 dB re 1 μPa^2m^2.

For the wellhead removal of the Julimar South-1 well, a decommissioning vessel operating on DP (MOU,WIV or subsea support (IMR) vessel may be used as described above.

Sound Transmission Loss Modelling

Woodside commissioned JASCO (Stroot et al., 2022) to undertake sound transmission loss modelling of several scenarios at the Julimar South-1 well location (water depth – 166.6 m) as well as a nominated OSV standby location (water depth – 150.2 m).

For well decommissioning activities, prior modelling conducted by JASCO for Woodside drilling operations at the XNA02 well, Xena field, (Wecker, et al., 2022) including a MODU under DP was identified as a conservative analogue given similar water depths and location of the Xena and Julimar fields.

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).

Source levels representative of drilling and well decommissioning 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 6-3**.

The source sounds were applied to the modelling scenarios for drilling and well decommissioning activities.

Table 6-3: Vessel source levels used in the acoustic modelling for the Petroleum Activity Program activities

Vessel	Sound Level (dB re 1 $\mu Pa^2.m^2.s$)	Reference

Moored MODU	175.4	(Stroot et al., 2022)
MODU under DP (well decommissioning scenario)	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 6-4** and **Table 6-5**.

Table 6-4: Summary of modelled scenarios for anchored drilling activities (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 6-5: Summary of modelled scenarios of a DP MODU at the Xena (XNA02) field as an analogue for DP operations during well decommissioning (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)

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, including mortality, injury, temporary reduction in hearing sensitivity and behavioural disturbance.

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)

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.

Cutting of Well Infrastructure

During the wellhead decommissioning activity, additional noise from the cutting of the surface casing and conductors is likely to be generated. 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.

Suction Piling

Suction piling may be required as a contingent activity for the BOP tether system. Unlike driven piles, suction piles greatly reduce noise generation, which is expected to be similar to continuous operational noise of a MODU when not actively drilling due to the noise only being generated from high rate pumps on the ROV conducting the suction piling. ROVs may also be used for other operations during the Petroleum Activities Program (e.g. localised sediment removal around infrastructure and cleaning of infrastructure) resulting in lower levels of noise emissions, which are also temporary in nature.

Cumulative noise sources

Decommissioning of the Julimar South-1 well will take place occur within approximately three years of completion of drilling activities, and the use of a decommissioning vessel on DP has been considered in this impact assessment section. Woodside recognises that the scope may be undertaken in line with future separate activity programs (e.g. Julimar Development Project Phase 3). The cumulative noise associated with conducting Julimar South-1 decommissioning concurrently with future work programs is outside the scope of this impact assessment and will be assessed in a future EP as relevant.

Impact Assessment

Potential impacts to environmental values

Receptors

The PAA is located in water depths of approximately 163 m (refer to **Section 3.3**). The fauna associated with this area will be predominantly pelagic species of fish, with migratory species such as cetaceans and marine turtles potentially occurring in the area seasonally (**Section 4.6**). Anthropogenic noise interference is a key threat to a number of migratory and threatened cetaceans and marine turtles identified as potentially occurring within the PAA, including the pygmy blue whale. Relevant actions included in recovery plans for these species are outlined in **Section 6.9.**

A pygmy blue whale migration BIA overlaps with the western edge of the PAA (**Section 4.6.3**). Individual pygmy blue whales may occasionally transit the PAA during April to July and October to January during their seasonal migrations. A humpback whale migration BIA is located about 20 km east of the PAA, and migrating whales may be present between about May and November. Occasional individuals may transit through the PAA.

A flatback turtle internesting buffer BIA overlaps with the PAA at the Montebello Islands. Green, loggerhead and hawksbill turtle interesting buffer BIAs at Montebello Island are 26 km, 36 km and 31 km east of the PAA respectively. 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 (with peak numbers expected March to July). A wedge-tailed shearwater breeding BIA overlaps with the PAA and wedge-tailed shearwaters will be present between August and April. Due to the lack of roosting or nesting habitat for wedge-tailed shearwaters in proximity to the PAA, only a low density is expected even during peak nesting periods.

One KEF overlaps the PAA: The Continental Slope Demersal Fish Communities KEF overlaps the western edge of the Survey Operational Area (**Figure 4-10)**. The continental slope between North West Cape and the Montebello Trough has been identified as one of the most diverse slope assemblages in Australian waters, with over 508 fish species and the highest number of endemic species (76) of any Australian slope habitat (DEWHA, 2008).

Potential Impact of Noise

Elevated underwater noise has the potential to affect marine fauna, including cetaceans, marine turtles, fish, 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); and
- 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 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) will depend upon several

factors such as water column depth, pressure, temperature gradients, and salinity, as well as surface and bottom conditions.

Cetaceans

Species Sensitivity and 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).

The thresholds that could result in a behavioural response, TTS and PTS for cetaceans as a result of continuous noise sources are presented in **Table 6-6.** These thresholds have been adopted by the United States National Oceanic and Atmospheric Administration (NOAA) (National Marine Fisheries Service [NMFS], 2014, 2018; Southall et al., 2019; NOAA, 2019). The adopted thresholds are based on best data available and published in peer-reviewed literature and represent conservative internationally accepted and applied impact evaluation thresholds for continuous (non-impulsive sound sources).

Table 6-6: Thresholds for PTS, TTS and behavioural response onset for low-frequency (LF), high-frequency (HF) and very high frequency (VHF) cetaceans for continuous noise.

Hearing group and generalised hearing range	Southall et al. (2019)		NOAA (2019)
	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)
LF cetaceans	199	179	120
HF cetaceans	198	178	120
VHF cetaceans	173	153	120

Source: Southall, 2019; NOAA, 2019

Predicted Underwater Noise Impacts to Cetaceans

The modelling study indicated that exceedances of the PTS and TTS thresholds for low frequency (LF) cetaceans may occur out to a maximum of 0.07 km and 0.92 km respectively for activities conducted at Julimar South-1 (Table 6-7)**.** For HF and VHF cetaceans, the maximum distances at which SPL exceeded PTS and TTS thresholds were 0.21 km and 2.76 respectively (Stroot et al., 2022).

During normal operations (the moored MODU drilling with an OSV on standby – Scenario 2), the maximum 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 6-7**).

As described above, the PTS and TTS thresholds are based on a cumulative metric that reflects the dosimetric impact of noise levels over a 24 hours period based on the assumption that an animal is consistently exposed to such noise levels at a fixed position. It is not expected that individual LF and HF cetaceans passing through the PAA during the drilling program would experience PTS or TTS, given individuals would need to remain within 70 m (PTS) and <1km (TTS) of the drilling activity for a period of 24 hours. This is based on the swimming speed of pygmy blue whales during migration tracked in Thums et al (2022a). The slowest individual of that study travelled at approximately 0.5 m/s or ~2 km/hour (Thums et al. (2022a)). Similarly, it is considered highly unlikely that any VHF cetaceans would experience PTS or TTS.

The behavioural response threshold may be exceeded at a maximum of 8.85 km from Julimar South-1 activities (3.57 km during normal operations).

Table 6-7: Maximum predicted distances (R_{max}), for a moored MODU, to PTS, TTS and behavioural response onset thresholds for cetaceans and marine turtles based on Southall et al. (2019) and Finneran et al. (2017). :

Maximum predicted distances (R_{max}), for a moored MODU, to PTS, TTS 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 (Typical Operations)	Scenario 3	Scenario 4	Scenario 5 (Typical Operations + Supply Vessel)
		R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)
PTS						
Low-Frequency (LF) cetaceans	199	–	–	0.05	0.07	0.07
High-frequency (HF) cetaceans	198	–	–	0.04	0.05	0.02
Very High-frequency (VHF) cetaceans	173	0.15	0.15	0.19	0.21	0.19
Marine Turtles	220	-	-	0.03	0.01	-
TTS						
Low-Frequency (LF) cetaceans	179	0.23	0.23	0.42	0.84	0.92
High-frequency (HF) cetaceans	178	0.09	0.09	0.12	0.15	0.13
Very High-frequency (VHF) cetaceans	153	1.42	2.57	1.50	1.73	2.76
Marine Turtles	200	-	-	0.05	0.05	0.07
Behavioural response						
Cetaceans	120 dB re 1 µPa SPL	1.07	3.57	8.25**		8.85

**See Table 6-4 for a full scenario description*

***Scenario 4 has been omitted from **Table 6-7** 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)

The analogous sound transmission loss modelling study by JASCO for a MODU on DP for the decommissioning of the Julimar South-1 well (Wecker et al., 2022) indicated that the PTS and TTS thresholds for low frequency (LF) cetaceans may be exceeded out to a maximum of 0.13 km and 2.66 km respectively across the scenarios modelled (**Table 6-8**). For HF and VHF cetaceans, the maximum distances at which sound levels exceeded PTS and TTS thresholds were 0.15 km and 2.63 km respectively.

During normal wellhead decommissioning 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. Individual LF, HF and VHF cetaceans that may pass through the PAA during decommissioning of the Julimar South-1 are expected to move further than 150 m away from the drilling activity relatively quickly (i.e. within 24 hours). TTS onset is considered highly unlikely given the known movement behaviour of cetaceans including key migrating LF whale species such as the pygmy blue whale (with tagged pygmy blue whales moving at least 0.54 m/s) 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 linger within the PAA for extended periods.

The behavioural response threshold may be exceeded at a maximum of 20.7 km from Julimar South-1 activities (17.2 km during normal operations).

Table 6-8: Maximum predicted distances (R_{max}), for a DP MODU, to PTS, TTS 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 (Typical Operations)	Scenario 10 (Typical Operations + Supply Vessel)
		R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)
PTS						
Low-Frequency (LF) cetaceans	199	0.08	0.11	0.13	0.08	0.13
High-frequency (HF) cetaceans	198	0.02	0.07	0.09	0.02	0.09
Very High-frequency (VHF) cetaceans	173	0.11	0.13	0.15	0.11	0.15
Marine Turtles	220	0.02	0.07	0.09	0.02	0.09
TTS						
Low-Frequency (LF) cetaceans	179	1.87	2.12	2.57	2.17	2.66
High-frequency (HF) cetaceans	178	0.09	0.11	0.13	0.09	0.13
Very High-frequency (VHF) cetaceans	153	2.31	2.35	2.51	2.44	2.63
Marine Turtles	200	0.1	0.11	0.14	0.10	0.14
Behavioural response (Cetaceans)	120 dB re 1 µPa SPL	17.1	20.5**		17.2	20.7

**See Table 6-5 for a full scenario description*

***Scenario 8 has been omitted from **Table 6-8** because Scenario 8 differs to Scenario 7 only by the time duration, and the SPL sound footprints represent the instantaneous sound field, independent on accumulation.*

Source: Wecker et al. (2022)

Potential behavioural disturbance to pygmy blue whales within the migration BIA and 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. (2022a) 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 that 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 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 important foraging areas identified by Thums et al. (2022a) 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 occur based on modelling presented above.

Humpback whales occur in the region, with a migration BIA located approximately 20 km east 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 sound transmission loss modelling studies by JASCO (Stroot et al., 2022; Wecker et al., 2022) predicted that received noise levels within the humpback whale migration BIA are below levels that would cause TTS impacts. Furthermore, there is a low likelihood of humpback whales (on northbound migrations) being exposed to noise levels above behavioural response threshold.

The PAA is surrounded by open water, with no restrictions (e.g., shallow waters, embayments) 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 not expected to be significant 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 humpback whale populations that regularly pass through areas of significant shipping traffic during their

migrations. Furthermore, MODU drilling, appraisal and plug and abandonment activities are scheduled to last approximately 50 days. Whilst drilling activities are scheduled to commence in Q3 2023, the survey and decommissioning activities may be stand alone and occur at any point throughout the life of the EP. Therefore, potential impacts to migrating cetaceans are not expected to be ecologically significant at a population level owing to the intermittent and short term nature of the activities.

Marine Turtles

Species Sensitivity and Thresholds

There is a paucity of data regarding responses of marine turtles to underwater noise. However, turtles have been shown to respond to low frequency sound, with indications that they have the highest hearing sensitivity in the frequency range 100–700 Hz (Bartol and Musick, 2003). Lenhardt (1994) observed marine turtles avoiding low-frequency sound. Popper et al. (2014) assessed thresholds for marine turtles and found qualitative results that TTS was only moderate for near field exposure, and low for both intermediate and far field exposure. McCauley et al. (2000) noted that sea turtles exhibit increased swimming activity at 166 dB re 1 µPa. No numerical thresholds have been developed for impacts of continuous sources (e.g., vessel noise) on marine turtles. The thresholds listed Table 6-9 Are considered appropriate for the assessment of impacts from continuous acoustic discharges to marine turtles from the Petroleum Activities Program. 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).

Table 6-9: Thresholds for PTS, TTS and behavioural response onset in marine turtles for continuous noise

Receptor	PTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)	TTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)	Masking	Behaviour
Marine turtles	220	200	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low

Source: PTS and TTS thresholds (Finneran et al., 2017)

Note: The sound units provided in the table above 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).

Impact Assessment

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 6-9**,** 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 decommissioning of the Julimar South-1 well (**Table 6-7** and **Table 6-8**).

Given the water depths and distance from shore, the PAA does not represent suitable foraging or interesting habitat. The PAA overlaps interesting Habitat Critical to the survival of flatback turtles, which is also designated a BIA. However, it is noted that the defined BIA and Habitat Critical are considered very conservative as they are based on the maximum range of interesting 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 interesting flatback turtles remain in shallow water, close (< 3 km) to nesting beaches (Whittock et al., 2014). There is no evidence to date to indicate flatback turtles swim out into deep offshore waters during the internesting period. Hence it is considered highly unlikely that the PAA is utilised by interesting 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 6-10** and are considered appropriate to assess continuous acoustic discharges to fish from the Petroleum Activities Program.

Table 6-10: 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 6-10,** 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, decommissioning 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 Continental Slope Demersal Fish Communities KEF, as described in **Section 4.7**. 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®), 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 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 Goodwyn A 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 this is over a wide area and is not spatially restricted.

Given the thresholds outlined in **Table 6-10**, 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.

Cutting of Wellhead

Twachtman et al. (2004) studied the operations and socio-economic impact of non-explosive removal of offshore structures, including noise and 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) described the underwater sound measurement data during an underwater diamond wire cutting of a 32" conductor (10 m above seabed in ~80 m depth) and 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 dynamic positioning. In another study, the US Navy measured underwater sound levels when the diamond saw was cutting caissons for replacing piles at an old fuel pier at Naval Base Point Loma (Naval Base Point Loma Naval Facilities Engineering Command Southwest 2017). They reported an average SPL for a single cutter at 136.1-141.4 dB SPL at 10 m, as reported in Fairweather Science (2018). 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 (WIV or MOU) immediately above the wellhead location. As such, noise from the cutting of the casing and conductors will not add to cumulative noise levels.

Summary of Potential Impacts to environmental values(s)

It is considered that noise generated by the MODU, decommissioning and project vessels will not result in an impact greater than localised impacts, with no lasting effect.

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[11]	**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[12]: • 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	F: Yes. CS: Minimal cost. Standard practice.	Implementation of controls for reduced vessel speed around cetaceans can potentially reduce the underwater noise footprint of a vessel and lower the likelihood of interaction above significant thresholds	Controls based on legislative requirements – must be adopted.	Yes **C 3.1**

[11] Qualitative measure

[12] 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)**[11]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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.				
Good Practice				
Implement adaptive management procedures prior to MODU DP start-up, when the MODU moves off location, and prior to resupply vessel moves alongside the MODU and decommissioning vessel.	F: Yes CS: Time / Cost associated with person used for observations. Schedule delays associated with waiting on pygmy blue whale activity to cease / move on.	Given the Operational Areas are adjacent to the pygmy blue whale migration BIA, detecting pygmy blue whale presence in the area before supply vessel moves alongside the MODU and decommissioning vessels reduces the likelihood of Pygmy blue whales being exposed to noise levels above impact thresholds. Detecting pygmy blue whale presence in the area prior to MODU DP Start-up will reduce the likelihood of pygmy blue whales that may be present being exposed to noise levels above impact thresholds when the new noise source (operation of DP) is introduced.	Benefits outweigh cost/sacrifice.	Yes **C 4.1**
Collect data on opportunistic sightings of pygmy blue whales to gauge presence and behaviour	F: Yes CS: Time / Cost associated with person used for	Collecting data on pygmy blue whale presence and behaviour may assist in increasing understanding of their	Benefits outweigh cost/sacrifice.	Yes **C 4.2**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[11]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	observations and in data collection	activity in the PAA to inform future activities.		
Use of additional detection methods (e.g., drones for aerial observations, Passive Acoustic Monitoring) to identify cetacean presence.	F: Yes CS: Time / cost associated with additional personnel and technology onboard vessels. Due to WA-49-L distance offshore actual observation times are limited by fuel availability – larger fuel capacity associated with larger aircraft increases cost of the exercise.	The use of additio–al detection methods may increase the likelihood of detection of whales, particularly during periods of poor visibility. Given no operational response is proposed in response to whale sightings, additional detection methods would not result in a reduction in the potential consequence level.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No.
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 and trained crew as MFOs will monitor for pygmy blue whale presence prior to resupply vessel moves alongside the MODU and decommissioning vessel and MODU DP start-up, additional MFOs would not further reduce the likelihood of an individual being within close proximity of the acoustic source during DP start-up or during operations.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
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	Not considered – control not feasible.	Not considered – control not feasible.	No

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS).[11]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	the MODU/ installation vessel. CS: Introduces unacceptable safety risk.			
Eliminate generation of noise from the MODU, installation vessel, support vessels or survey 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
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 noise 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.				

Demonstration of Acceptability
Acceptability Statement

The impact assessment has determined that the generation of noise from project vessels, MODU, and positioning equipment will not result in a potential impact greater than localised and temporary impacts, with no lasting effect. Relevant recovery plans and conservation advice have been considered during the impact assessment. *The Conservation Management Plan for the Blue Whale* (Commonwealth of Australia, 2015a) Interim Recovery Objective is that 'Anthropogenic threats are demonstrably minimised' with the following Action Area A.2.3: "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". The associated Guidance on Key Terms within the Blue whale Conservation management Plan (DAWE, 2021) provides further clarification that where it can be reasonably predicted that blue whale foraging is probable, known or whale presence is detected, adaptive management should be used during industry activities to prevent unacceptable impacts. While drilling activities occur outside of any pygmy blue whale BIA, the impact assessment determined it is not expected that individual PBW 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 <1km (TTS) of the drilling activity for a period of 24 hours. For decommissioning activities TTS may extend to 2.66 km however TTS onset is also considered a remote likelihood given the known movement behaviour of pygmy blue whale. In addition, with the adoption of adaptive management controls (**C 3.2**) the activity will be managed to reduce anthropogenic noise on pygmy blue whales and is therefore not inconsistent with the Interim Recovery Objective (**Section 6.9**).

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.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 3 No impact to marine fauna from noise emissions greater than F[13].	**C 3.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[14]: • 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	**PS 3.1.1** Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) Interacting with cetaceans	**MC 3.1.1** Records demonstrate no breaches with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.

[13] Defined as ' Environment – No lasting effect (less than one month); localised impact not significant to environmental receptors.' as in **Table 2-3/ Section 2.6.3.**

[14] 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.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.		
EPO 4 Undertake the Petroleum Activities Program in a manner that does not cause acoustic injuries or prevent biologically important behaviours to pygmy blue whales	**C 4.1** Implement adaptive management procedures prior to MODU DP start-up when the MODU moves off location and prior to resupply vessel moves alongside the MODU and decommissioning vessel.	**PS 4.1.1** Implement adaptive management procedure during daylight hours. Adaptive management procedure to include: • Use of trained vessel crew as MFOs (MODU) • Trained crew as MFOs monitor for pygmy blue whales 30 minutes prior to resupply vessel moves alongside the MODU • Trained crew as MFOs monitor for pygmy blue whales 30 minutes prior to DP start-up when MODU, moves off location • Proceed with move or DP start up only when no pygmy blue whales have been sighted, to the limits of visibility, over the 30 minute monitoring period.	**MC 4.1.1** Records demonstrate trained vessel crew onboard the MODU and decommissioning vessel. **MC 4.1.2** Pygmy blue whale sighting records demonstrate trained MODU on watch • Prior to resupply vessel moves alongside, and • During DP start-up when the MODU moves off location in the Operational Area. **MC 4.1.3** • Records demonstrate when PBW presence detected, the following are not commenced: • The resupply vessel moves alongside the MODU and decommissioning vessel, and • DP start-up when the MODU moves off location in the

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
			Operational Area.
	C 4.2 Collect data on opportunistic sightings of Pygmy Blue Whales to gauge presence and behaviour	**PS 4.2.1** Process developed for collecting PBW sighting data PBW sighting data sent to relevant organisations as required (i.e. Australian Marine Mammal Centre (AMMC)	**MC 4.2.1** Records demonstrate process developed and communicated to crew for collection of Pygmy Blue Whale siting data

6.7.4 Routine Acoustic Emissions: Generation of Noise from Geophysical and Geotechnical Surveys

Context		
Relevant Activities Geophysical Survey – **Section 3.8.1** Geotechnical Site Survey – **Section 3.8.2**	**Existing Environment** Regional context – **Section 4.2** Protected Species – **Section 4.6** Socio-economic Environment – **Section 4.9**	**Consultation** Consultation – **Section 5**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	***Water Quality***	***Air Quality (incl Odour)***	***Ecosystems/Habitat***	***Species***	***Socio-economic***	***Decision Type***	***Consequence / Impact***	***Likelihood***	***Risk Rating***	***ALARP Tools***	***Acceptability***	***Outcome***
Generation of noise from geophysical survey equipment				□	□	□	A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 4
Generation of acoustic signals from positioning equipment (transponders)					□		A	F	-	-			

Description of Source of Impact

Geophysical Survey Activities

Geophysical survey instruments will be used to characterise the sea floor and sub-sea floor characteristics within the Survey Operational Area across WA-4-L, WA-5-R, WA-76-R and WA-526-P. The various survey instruments that may be used are described in **Section 3.8.1** and include:

- Sub-bottom profiler (SBP; either chirp, boomer or sparker)
- Multibeam echo sounder (MBES)
- Side-scan sonar (SSS)
- Ultra Short Baseline (USBL) positioning system.

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 50 Hz and 30 kHz with source levels between approximately 192 and 220 dB re 1µPa (SPL) at 1 m.

MBES and SSS are very high-frequency and high resolution systems, producing short micro-pulses of sound at frequencies in the tens or hundreds of kilohertz. The high-frequency pulses of sound produced by MBES are focused within multiple highly directional and narrow beams, which form a fan shape directed at the seabed (Salgado Kent et al., 2016; Jiménez-Arranz et al., 2017). SSS also produces sound in a focussed swath directed at the seabed. The pulses of sound produced by these instruments are of such high frequency that they rapidly attenuate outside of the beam (Zykov, 2013). Despite relatively high source levels, the high operating frequencies of most MBES and SSS

places the dominant sound frequencies above the principal auditory range of most marine fauna species, although mid-frequency cetaceans that may occur in the PAA (e.g. dolphins) have the capability to hear some of the sound energy at the lower end of the operating frequency ranges (US National Marine Fisheries Service [NMFS] 2018).

An Ultra Short Baseline (USBL) system will also be used during the survey for the purpose of accurate underwater positioning. USBL systems work by emitting short pulses of medium to high frequency sound (19 to 34 kHz) in short 'chirps'. Source levels are in the order of 184–202 dB re 1µPa (SPL) at 1 m. The operating frequency range is above the auditory range of low frequency cetaceans (peak hearing at 0.2-19 kHz; NMFS 2018), marine turtles and the majority of fish species (<1 kHz; Ladich 2000; Popper et al. 2014). Similar to MBES and SSS, dolphins have the capability to hear the sound produced from USBL.

The source levels and sound frequencies produced by the individual survey instruments are summarised in **Section 3.6.6**. When underway, geophysical activities will occur for 10 – 15 days, 24 hours per day.

Geotechnical Survey Activities

The key sound sources during geotechnical surveys include the penetration tests and sampling boreholes undertaken at the seabed. Sound levels associated with standard penetration testing and small-core drilling have been measured in waters off WA (Erbe & McPherson, 2017). The broadband (20 Hz – 24 kHz) source levels for penetration testing were 151 – 160 dB re 1 uPa2s SEL at 1 m (equivalent to approximately 160 – 170 dB re 1 µPa SPL at 1 m), with received levels reducing to approximately 141 to 146 dB re 1 µPa SPL within 20 m distance from the source (Erbe & McPherson, 2017). The broadband (30 Hz – 2 kHz) drilling source levels were 142 – 145 dB re 1 µPa SPL at 1 m (Erbe & McPherson, 2017). The reported levels are tens of decibels less than those produced during production or construction operations and below levels commonly considered in marine noise regulations (Erbe & McPherson, 2017).

Underwater sound produced by the geophysical and geotechnical survey instruments has the potential to affect marine fauna that may pass within close proximity to survey operations. The potential effects to habitats and ecosystems (i.e. benthic invertebrate communities, planktonic communities, KEFs), as well as indirect effects to commercial fisheries associated with the potential disturbance to fishes is also considered.

When underway, geotechnical survey activities will occur for 30 days, 24 hours per day.

Generation of Underwater Noise from Positioning Equipment

An array of long baseline (LBL) transponders may be installed on the seabed as required to support drilling activities. 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 per well. During survey activities, ultra-short baseline transponders (USBL) may be installed on the seabed or mounted on the wellhead as required by the sub-sea installation activities. Transmission from USBL transponders are similar to LBL transponders and are described above in relation to the geophysical survey.

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). Transponders are expected to be only active at the commencement of the drilling where positioning is required.

Cumulative noise sources

Cumulative acoustic impacts have the potential to occur from IMR activities on the nearby JUL-A production manifold or, work undertaken to decommission the wellhead may also occur at the same time as activities conducted for JDP3 (covered under a separate EP), which may result in slightly elevated noise levels. Activities conducted on the JUL-A production manifold are likely to consist of one project vessel and are not expected to significantly increase impacts to marine fauna. Whilst the number of vessels that may be utilised for JDP3 is yet to be determined, the wellhead decommissioning scope is likely to consist of two project vessels, operating for a short duration (approximately 2 days), to be opportunistically undertaken after the drilling activity (3 years) . In this case, impacts to marine fauna are likely to be minor and temporary in nature.

Impact Assessment

Potential impacts to environmental values

Receptors

The Survey Operational Area is located in water depths of approximately 101 - 164 m (refer to **Section 3.3**). The fauna associated with this area will be predominantly pelagic species of fish, with migratory species such as cetaceans and marine turtles potentially occurring in the area seasonally (**Section 4.6.5**). Noise interference is a key threat to a number of migratory and threatened cetaceans and marine turtles identified as potentially occurring within the Survey

Operational Area, including the pygmy blue whale. Relevant actions included in recovery plans for these species are outlined in **Section 6.9.**

A pygmy blue whale migration BIA overlaps with the PAA (**Section 4.6.3**). Individual pygmy blue whales may occasionally transit the PAA during April to July and October to January during their seasonal migrations. A humpback whale migration BIA is located about 20 km east of the PAA and migrating whales may be present between about May and November. Occasional individuals may transit through the PAA.

A flatback turtle internesting buffer BIA overlaps with the PAA at the Montebello Islands. Green, loggerhead and hawksbill turtle interesting buffer BIAs at Montebello Island are about 26 km, 36 km and 31 km east of the PAA respectively. 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 (with peak numbers expected March to July). A wedge-tailed shearwater breeding BIA overlaps with the PAA and wedge-tailed shearwaters will be present between August and April. Due to the lack of roosting or nesting habitat for wedge-tailed shearwaters in proximity to the PAA, only a low density is expected even during peak nesting periods.

Whilst the Ancient Coastline KEF may be associated with outcroppings of hard substrate, no evidence of significant reefs associated with such outcroppings has been found in the PAA. Note some demersal fish are likely to be associated with subsea infrastructure (McLean et al. 2017).

Potential Impact of Noise

Geophysical and geotechnical survey techniques will generate impulsive sound sources.

Elevated underwater noise from impulsive sound sources have the potential to affect marine fauna, including cetaceans, marine turtles, fish, 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); and
- 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 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) will depend upon several factors such as water column depth, pressure, temperature gradients, and salinity, as well as surface and bottom conditions.

Cetaceans

Species Sensitivity and Thresholds

Sound exposure thresholds and criteria for impulsive sound sources applicable to the types of cetaceans that may be present near the PAA are summarised in **Table 6-11** below.

A range of behavioural changes can occur in marine fauna in response to sound pressure levels. Onset of behavioural disturbance to cetaceans has been reported to occur in response to sound levels ranging from 120 to over 180 dB re 1 µPa SPL (Southall et al., 2007). This may include minor responses, such as a momentary pause in vocalisation or reorientation of an animal to the source of the sound, or stronger avoidance responses (Southall et al., 2007). The US NMFS propose a threshold of 160 dB re 1 µPa SPL for a potentially significant behavioural response to impulsive sound sources (NMFS, 2014).

Thresholds for potential hearing impairment, in terms of PTS or TTS are presented as dual metric criteria, the peak pressure (PK) from a single impulse or the sound exposure level (SEL) accumulated from multiple impulses over a period of 24 hours (SEL_{24h}). The SEL_{24h} thresholds are frequency weighted according to the auditory weighting categories of different types of cetaceans, including low frequency cetaceans (large baleen whales such as humpback and pygmy blue whales) and mid-frequency cetaceans (toothed whales and dolphins). The PK thresholds for a single impulse are not frequency weighted.

Table 6-11: Exposure thresholds for impulsive sounds applicable to cetaceans

Hearing group	NMFS (2014)	NMFS (2018)			
	Behaviour	PTS onset thresholds (received level)		TTS onset thresholds (received level)	
	SPL (L_p; dB re 1 µPa)	Weighted SEL_{24h} ($L_{E,24h}$; dB re 1 µPa^2·s)	PK (L_{pk}; dB re 1 µPa)	Weighted SEL_{24h} ($L_{E,24h}$; dB re 1 µPa^2·s)	PK (L_{pk}; dB re 1 µPa)
Low-frequency cetaceans	160	183	219	168	213
Mid-frequency cetaceans		185	230	170	224

Impact Assessment

Acoustic modelling of sub-bottom profilers by Zykov (2013), MacGillivray et al. (2013) and McPherson and Wood (2017), indicates limited horizontal sound propagation outside of the main directional beams of sound. The modelling studies also indicate that PK and SEL_{24h} thresholds for PTS are not exceeded. The potential for TTS resulting from single pulse PK pressure exposure is not predicted to occur, while the potential for TTS resulting from SEL_{24h} exposures is limited to a few metres from the moving sound source (Zykov, 2013; McPherson and Wood 2017), which is not expected for mobile marine fauna as they are likely to move out of the area relatively quickly. Exceedance of the 160 dB re 1 µPa SPL behavioural response threshold is limited to within a few tens of metres in most instances, or up to a maximum of 150 m depending upon which instrument is used, water depth and the seabed sediment characteristics (Zykov, 2013; McPherson and Wood 2017).

The very high-frequency micro-pulses of sound produced by the MBES and SSS also rapidly attenuate outside of the beam (MacGillivray et al., 2013; Zykov, 2013). The high operating frequencies of these instruments also places the majority of sound frequencies above the auditory range of most marine fauna species. Dolphins and other mid-frequency cetaceans, which have peak hearing sensitivity up to 110 kHz, with potential for some limited hearing ability up to approximately 160 kHz (NMFS 2018), may be able to detect a small amount of the sound energy from some MBES and SSS instruments in the lower operating frequency ranges (MacGillivray et al., 2013; Zykov, 2013). The propagation of the high frequency sound from MBES and SSS with similar source frequency characteristics as those proposed for the Petroleum Activities Program has been undertaken by Zykov (2013) and MacGillivray et al. (2013). The modelling results indicate that the sound emissions outside of the main beams are below the threshold levels for potential injury, permanent threshold shift (PTS) or temporary threshold shift (TTS). Sound levels that may result in behavioural effects are likely limited to within tens of metres, but potentially up to a few hundreds of metres from the sound source for mid-frequency cetaceans (Zykov, 2013; MacGillivray et al., 2013).

USBL positioning equipment also produces high frequency sound, which may only be audible to dolphins and other mid-frequency cetaceans. The USBL has lower source levels than the other instruments proposed for the geophysical survey and is not expected to result in any injury or hearing impairment. Some localised behavioural effects may occur in close proximity to the USBL, but the extent of any effect is expected to be smaller than that of other survey instruments and there is not expected to be any lasting behavioural effects.

Sound emitted from the geotechnical activities at the seabed (penetration tests and sampling boreholes) may be at levels that result in very localised behavioural effects to animals that happen to be exposed within less than 10 m, but such effects will be temporary and the sound levels are well below those that may result in any injury or hearing impairment (Erbe & McPherson, 2017).

Based on the above assessment, the geophysical and geotechnical survey activities are expected to result in behavioural effects to cetaceans within tens or hundreds of metres from the survey activities. Such localised effects and potential deviations are not expected to be significant given the transient nature of cetaceans or in the context of long distance migrations undertaken by pygmy blue whales or other migratory species that might be present. It is highly unlikely that TTS effects will occur as individual animals are unlikely to remain within range of the survey activities (i.e. within a few hundred metres of the passing geophysical survey vessel) for durations long enough for the relevant sound exposure threshold to be exceeded.

Marine turtles

Species Sensitivity and Thresholds

Sound exposure thresholds and criteria for impulsive sound applicable to marine turtles are summarised in **Table 6-12** below.

McCauley et al. (2000) observed the behavioural response of caged green and loggerhead turtles to 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. Finneran et al., (2017) presented thresholds for turtle PTS and TTS, considering both PK and frequency-weighted SEL, which have been applied in this study,

Table 6-12: Exposure thresholds for impulsive sounds applicable to marine turtles

McCauley et al. (2000), NSF (2011)McCauley et al. (2000), NSF (2011)	**Finneran et al. (2017)**			
Behaviour	**PTS onset thresholds (received level)**		**TTS onset thresholds (received level)**	
SPL (L_p; dB re 1 µPa)	**Weighted SEL_{24h}** ($L_{E,24h}$; dB re 1 µPa^2·s)	**PK** (L_{pk}; dB re 1 µPa)	**Weighted SEL_{24h}** ($L_{E,24h}$; dB re 1 µPa^2·s)	**PK** (L_{pk}; dB re 1 µPa)
160	204	232	189	226

Impact Assessment

Sound levels that are likely to be produced by various different SBP instruments are predicted to fall below the 166 dB re 1 µPa SPL threshold within a few metres or tens of metres (Zykov, 2013; McPherson and Wood 2017). The high-frequency sounds produced by the MBES, SSS and USBL are expected to be above the auditory range of marine turtles and so behavioural impacts are not expected to occur.

As with cetaceans, the sound produced during geotechnical activities may only result in very localised behavioural effects to animals that happen to be exposed within less than 10 m, but such effects will be temporary and the sound levels are well below those that may result in any injury or hearing impairment.

The PAA overlaps the internesting BIA of flatback turtles nesting at the Montebello Islands (with peak nesting between December and January). However, recent studies have demonstrated that the PAA does not represent suitable habitat for flatback turtles during the internesting period (Whittock et al., 2016) and turtles are not expected to be present in significant numbers. The localised and short-term behavioural disturbances that may result from the geophysical survey will not have a discernible impact on internesting behaviours or result in the displacement of individual animals (potentially exposed within tens of metres of the passing geophysical survey vessel for a brief period). As a result, and given the temporary nature of the survey activities, no population level impacts are expected.

Fishes and Elasmobranchs

Species Sensitivity and 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 & 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 PAA (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, and are susceptible to barotrauma.

Sound exposure thresholds and criteria applicable to the types of fishes and sharks that are likely to occur in the PAA are summarised in **Table 6-13** below.

Popper et al. (2014) proposed a relative risk criteria (high, moderate, low) for 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). It is important to note however, that the criteria are based on studies into the effects of exploration seismic surveys and are therefore highly conservative for the low energy geophysical instruments proposed for this activity.

Table 6-13: Sound exposure thresholds and criteria for impulsive sounds applicable to fishes

Type of animal	Mortality and Potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Fish: No swim bladder (particle motion detection)	>219 dB SEL_{24h} or >213 dB PK	>216 dB SEL_{24h} or >213 dB PK	>>186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: Swim bladder not involved in hearing (particle motion detection)	210 dB SEL_{24h} or >207 dB PK	203 dB SEL_{24h} or >207 dB PK	>>186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: Swim bladder involved in hearing (primarily pressure detection)	207 dB SEL_{24h} or >207 dB PK	203 dB SEL_{24h} or >207 dB PK	186 dB SEL_{24h}	(N) Low (I) Low (F) Moderate	(N) High (I) High (F) Moderate

Impact Assessment

The potential for injury or TTS effects to fish resulting from single impulse PK or accumulated exposures to SBP, MBES and SSS sound is limited to within 1–2 m beneath or to the side of the sound source (Zykov, 2013; McPherson and Wood 2017). Single impulse exposures at this range are highly unlikely to occur as are accumulated exposures over several hours at this range.

The impacts to fishes are, therefore, likely to be limited to localised and temporary behavioural changes. The criteria suggested by Popper et al. (2014) in **Table 6-13** are based on exploration seismic surveys and are therefore highly conservative for the low energy geophysical instruments proposed for this activity. Therefore, the potential behavioural effects to the demersal and pelagic fish species in the PAA (which are primarily sensitive to close-range particle motion changes rather than sound pressure) are likely to be limited to within tens of metres of the various geophysical and geotechnical sound sources proposed for this activity.

Impacts to protected species of sharks and rays, such as whale sharks, are not expected given that sharks do not possess swim bladders and are not sensitive to sound pressure. The PAA overlaps with the BIA for foraging whale sharks, however, the potential for behavioural effects within just tens of metres of the geophysical survey instruments indicates that behavioural effects will not be significant and whale sharks will be able to continue to utilise the wider area for foraging.

Cumulative Underwater Sound Impacts

Given the very localised extent of potential effects from the geophysical and geotechnical survey techniques described above, there is limited potential for the Julimar geophysical and geotechnical survey to contribute to cumulative sound impacts within the areas accessed by fisheries in the region.

The potential for cumulative impacts to arise from other concurrent activities is also considered. As described in **Section 4.9.8**, existing subsea infrastructure associated with the Julimar Field Production System is located within the PAA. However, production noise produced by this infrastructure will be relatively low and no significant cumulative impacts are expected. Activities associated with JDP3 are currently anticipated to occur in about 2024/ 2025 and may temporally overlap with the Petroleum Activities Program (**Section 6.5**). Vessel noise associated with these activities may result in some localised behavioural effects in addition to those that result from the geophysical and geotechnical activities, but the cumulative effects will be limited. The cumulative noise associated with conducting Julimar South-1 survey activities concurrently with future work programs is outside the scope of this impact assessment and will be assessed in a future EP as relevant.

Overall, cumulative impacts associated with sound emitted during the Julimar geophysical and geotechnical survey are likely to be temporary and are expected to have no lasting effect.
Summary of Potential Impacts to environmental values(s)
Sound generated by the various geophysical and geotechnical survey instruments may result in localised and temporary behavioural changes to marine fauna. These potential effects are limited to within tens or hundreds of metres from the geophysical survey lines. Acoustic related injury to protected species is not anticipated. The behavioural effects will not have a lasting impact on protected species (i.e. Environment Impact – F)

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[15]***	***Benefit in Impact/Risk Reduction[16]***	***Proportionality***	***Control Adopted***
ALARP Tool Used – Section 2				
EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[17]: • 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	F: Yes. CS: Minimal cost. Standard practice.	Implementation of controls for reduced vessel speed around cetaceans can potentially reduce the underwater noise footprint of a vessel and lower the likelihood of interaction above significant thresholds	Controls based on legislative requirements – must be adopted.	Yes **C 3.1**

[15] Qualitative measure

[16] Measured in terms of reduction of likelihood (L), consequence (C) and current risk rating (CRR)

[17] 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)[15]***	***Benefit in Impact/Risk Reduction[16]***	***Proportionality***	***Control Adopted***
approach closer than 30 m of a whale shark.				
Good Practice				
Implement an observation and shut-down zone around geophysical survey equipment and implement start-up delay and shutdown procedures for: • cetaceans • marine turtles • whale sharks.	F: Yes. However, as marine fauna are underwater, topside observations are not always effective in identifying marine fauna close to the sound source. CS: Moderate. Requires use of a dedicated, suitably trained crew member or marine fauna observer (MFO) to undertake marine fauna observations and distance estimations. Shutdowns will result in delays and potential increase in the geophysical survey duration.	Limited/none. The purpose of shutdown zones and procedures is to prevent acoustic injury and reduce the risk of hearing impairment to marine fauna in close proximity to the sound source. No acoustic injury is expected from the MBES, SBP or other geophysical survey equipment.	Disproportionate. Limited environmental benefit and additional costs.	No
Apply soft start procedures.	F: Not feasible. The geophysical instruments do not comprise multiple acoustic elements or have limited other means to ramp-up pulses, so implementing a soft start at lower sound levels is not possible. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Professional Judgement – Eliminate				
Only conduct geophysical activities outside peak sensitivity periods for noise sensitive marine fauna.	F: Not feasible. Timing of activities is linked to project schedule and, due to vessel availability and operational requirements, undertaking activities during the pygmy	Not considered – control not feasible.	Not considered, control not feasible.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[15]***	***Benefit in Impact/Risk Reduction[16]***	***Proportionality***	***Control Adopted***
	blue whale migration, turtle internesting, of fish spawning seasons is unavoidable. CS: Not considered, control not feasible.			
Professional Judgement – Substitute				
Use geophysical survey instruments with lower source levels or with different operating frequencies from the frequencies utilised by marine fauna.	F: Not feasible. The types of geophysical survey instruments have been selected based on the type and resolution of data that is required to adequately survey the shallow seabed geology. CS: Not considered, control not feasible.	Not considered – control not feasible.	Not considered – control not feasible.	No
Professional Judgement – Engineered Solution				
Passive Acoustic Monitoring (PAM)	F: Yes. However, the reliance on marine fauna (cetaceans) vocalising and challenges with accurate distance estimation limit the effectiveness of this option. CS: Additional costs for PAM operators on board the vessel. Operational costs of unnecessary shutdowns as a result of false detections or inaccurate distance estimations potentially prolong the activity.	PAM has limited applicability given that shutdown procedures are not proposed to be implemented. Given the already very low level of impact, applying PAM will provide little/no benefit.	Disproportionate. Additional costs for little/no benefit.	No
ALARP Statement On the basis of the environmental impact assessment outcomes and use of the relevant tools appropriate to the decision type (i.e. Decision Type A), Woodside considers the adopted controls appropriate to manage the potential impacts of routine acoustic emissions from the geophysical and geotechnical survey 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 ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[15]***	***Benefit in Impact/Risk Reduction[16]***	***Proportionality***	***Control Adopted***
Demonstration of Acceptability				
Acceptability Statement The impact assessment has determined that sound generated by the survey instruments is not likely to result in acoustic injury to protected species or other marine fauna. Localised and short-term behavioural impacts may occur, but these are unlikely to result in a significant or lasting effect to marine fauna as individuals or populations. Further opportunities to reduce the impacts and risks have been investigated above. The potential impacts and risks are considered broadly acceptable. Therefore, Woodside considers standard operations appropriate to manage the impacts and risks of the survey vessel acoustic emissions to a level that is broadly acceptable				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 3 No impact to marine fauna from noise emissions greater than F[18].	**C 3.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[19]: • 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	**PS 3.1.1** Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) Interacting with cetaceans	**MC 3.1.1** Records demonstrate no breaches with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.

[18] Defined as ' Environment – No lasting effect (less than one month); localised impact not significant to environmental receptors.' as in **Table 2-3/ Section 2.6.3.**

[19] 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.

	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.		

6.7.5 Physical Presence – Interaction with Other Marine Users

Context		
Relevant Activities Blowout Preventer and Marine Riser Installation – **Section 3.6.1.3** Optional Decommissioning Activities – **Section 3.6.6** Project Vessels and Support Activities – **Section 3.9** Helicopter Operations – **Section 3.9.7** Wellhead Assembly Left In-situ – **Section 3.10.5**	**Existing Environment** Socio-economic Environment **– Section 4.9**	**Consultation** 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*
Interaction with other marine users – proximity of MODU and project vessels interfering with or displacing third party vessels (commercial fishing and commercial shipping)						X	A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 5, 6
Presence of subsea infrastructure interfering with or displacing third party vessels (commercial fishing)						X							

Description of Source of Impact

MODU and Vessel Operations

Drilling activities

The movement of vessels within the PAA, and the physical presence of the MODU and vessels, have the potential to displace other marine users.

The MODU will have a 500 m safety exclusion zone within the PAA for the duration of the Petroleum Activities Program. Drilling appraisal and plug and abandonment operations are expected to take approximately 50 days to complete, including mobilisation, demobilisation and contingency. Wellhead decommissioning activities performed from the decommissioning vessel are anticipated to take approximately 2 days.

Other vessels are also required during the Petroleum Activities Program, including survey and other support vessels. Some vessels will need to transit in and out of the PAA to port for emergency and routine operations.

Geophysical and Geotechnical Survey

The physical presence and movement of a survey vessel within the PAA, has the potential to displace other marine users.

The Petroleum Activities Program consists of a geophysical survey and a geotechnical site survey that are expected to take between approximately 15 and 30 days, respectively to complete. It is noted that the timing and duration of these

activities is subject to change due to project schedule requirements, vessel availability, unforeseen circumstances and weather (i.e. cyclones). Geophysical and geotechnical surveys may take place any time during the life of this EP (**Section 3.4**).

Well Abandonment

After appraisal, the Julimar South-1 well will be plugged and abandoned under the scope of this EP. Well abandonment may also occur in the event of a respud (**Section 3.10.1**) A number of vessels (outlined in **Section 3.9**) will be temporarily present in the Well Operational Area during the Petroleum Activities Program to permanently plug the well and remove all associated well infrastructure above the seabed. As detailed in **Section 3.6.6**, permanent plugging will occur immediately following the drilling program, to be conducted by the on station MODU.A subsea support vessel (IMR vessel or AHV) will be used to conduct IMR activities such as removal of marine growth prior to the permanent plugging activity, this will take an estimated one day.

A decommissioning vessel such as a MOU, WIV or subsea support (IMR) vessel may be used to cut and recover infrastructure following plugging activities. Recovery of infrastructure will likely take between about 1-2 days, including a seabed clearance survey.

Support vessels will also be present within the Well Operational Area and may include an AHV (to set anchors and support MODU operations if required) and activity support vessels such as cargo vessel(s) which will be used for transporting of equipment and materials. The presence of these project vessels and MODU in the Well Operational Area presents an opportunity for interaction with third-party marine users.

Physical presence of subsea infrastructure

The wellheads will take up a small area on the seabed and will rise several metres above the seabed. The wellhead will be located within the PAA for a period of up to about three years post completion of drilling activities under the scope of this EP. The well will be plugged and abandoned and every reasonable attempt made to retrieve the wellhead. However, the wellhead assembly may be left in-situ if routine removal techniques are unsuccessful. If the wellhead is left in-situ, it could potentially interfere with third party activities (particularly fishing activities).

Impact Assessment

Potential impacts to environmental values

Interaction with other marine users due to the physical presence of in the Petroleum Activities Program may result in the following impact:

- 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 Fisheries

Four State managed fisheries overlap the PAA (Pilbara Trap and Line Fisheries, Mackerel Managed Fishery, Pilbara Crab Managed Fishery) (**Section 4.9.3**). Potential impacts to commercial fishers depend on the use of the area by fishers, in addition to the temporal and spatial extent of the presence of vessels and facilities/infrastructure.

Potential impacts to commercial fisheries include damage to fishing equipment and potential physical displacement from fishing grounds. The presence of vessels (and MODU) in the PAA will present a surface hazard to fishing vessels and potentially result in a temporary exclusion from the 500 m safety exclusion zones required around the MODU and decommissioning vessel (if required).

The PAA is not an area of high commercial fishing activity. Furthermore, the 500 m temporary exclusion zones around the MODU comprises a relatively small area when compared to the extent of the individual fishery boundaries that overlap. As such, any potential displacement of commercial fisheries due to activities in the PAA is expected to be temporary and have no lasting effect.

Continued temporary presence of Julimar South-1 well infrastructure

The continued presence of well infrastructure may occur for up to about 3 years post completion of drilling activities until its removal by a decommissioning vessel. However, the gear types (line, trap) of overlapping active fisheries (Pilbara Trap and Line Fisheries, Pilbara Crab Managed Fishery, Mackerel Managed Fishery) (Newman et al., 2021) are unlikely to result in an adverse interaction with well infrastructure. Furthermore, as discussed in **Section 4.9.8**, the PAA overlaps part of the Julimar Field Production System, in an area of regionally significant oil and gas infrastructure.

The magnitude of potential impacts to commercial fisheries from activities associated with the Petroleum Activities Program 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 Julimar region and the temporary nature of the activity, reduced the likelihood of displacement of commercial fishers.

Tourism and Recreation

Tourism and recreation within the PAA are expected to be limited by the distance offshore and water depths. Consultation did not identify any key recreational fishing activity within the PAA. Given the location, and the short-term nature of activities, impacts to tourism and recreational activities are not expected.

Shipping

Shipping activity in the PAA is low, with no shipping fairways located within the PAA. Vessel traffic data shows that the majority of vessel movements occur to the south-east of the PAA. Given the short-term nature of the activities and the low level of shipping activity within the PAA, impacts to shipping are unlikely.

Industry

The NWS is an area of active oil and gas exploration and production. The closest facility to the PAA is the Woodside Pluto Platform (approximately 30 km to the north-east). Displacement of, or interference with, other oil and gas activities are not expected within the PAA. Impacts to industry are therefore unlikely.

Defence

Defence activities in the vicinity of the PAA may include Naval vessel traffic and Air Force training exercise areas. Neither of these types of activities are expected to be a consistent presence in the area. The PAA is on the outer extent of the training area associated with the Learmonth Air Force Base. Department of Defence (DoD) advised Woodside that part of the proposed Operational Area is located within the North West Exercise Area (NWXA) and restricted airspace and unexploded ordnance (UXO) may be present on and in the sea floor within the NWXA. No objections or claims have been received about activity impacts or risks. DoD requested notifications prior to commencement of the activity (PS 5.8).

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that physical presence of the MODU, project vessels and subsea infrastructure will not result in a potential impact greater than localised, temporary displacement of shipping and commercial/recreational fishing interests with no lasting effect (i.e. Socio - Economic Impact – F).

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[20]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
Vessels to adhere to the navigation safety requirements including the Navigation Act 2012 and any subsequent Marine Orders.	F: Yes. CS: Minimal cost. Standard practice.	The Navigation Act regulates ship related activities and invokes certain requirements of MARPOL. Vessels (relevant to class) will adhere to requirements.	Benefits outweigh cost/sacrifice. Control is also Standard Practice	Yes **C 5.1**
Establishment of a 500 m petroleum safety zone around MODU (and decommissioning vessel if required) and communicated to marine users.	F: Yes. CS: Minimal cost. Standard practice.	Establishment of a 500 m petroleum safety zone around MODU and decommissioning vessel reduces the likelihood of interaction with other marine users.	Benefits outweigh cost/sacrifice. Control is also Standard Practice	Yes **C 5.2**
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 5.3**
Good Practice				
Australian Hydrographic Office (AHO) will be notified of activities and	F: Yes.	Notification of AHO will enable them to update maritime charts thereby	Benefits outweigh cost/sacrifice.	Yes **C 5.4**

[20] Qualitative measure

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[20]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
movements no less than four working weeks prior to commencement of the Petroleum Activities Program.	CS: Minimal cost. Standard practice.	reducing the likelihood of interaction with other marine users.	Control is also Standard Practice.	
Notify relevant government departments, fishing industry representative bodies and licence holders 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 5.5**
Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities and movements 24 to 48 hours before operations commence.	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 5.6**
Notify relevant persons for activities within the Petroleum Activities Program that commence more than a year after EP acceptance.	F: Yes CS: Minimal cost. Standard Practice	Communicating the Petroleum Activities Program to other marine users ensures they are informed and aware, thereby reducing the likelihood of interfering with other marine users.	Benefits outweigh cost/sacrifice. Control is also Standard Practice	Yes **C 5.7**
Notify Defence of activities no less than five weeks before the scheduled activity commencement date. This will include confirmation of any restricted airspace.	F: Yes CS: Minimal cost. Standard Practice	Communicating the Petroleum Activities Program to other marine users ensures they are informed and aware, thereby reducing the likelihood of interfering with other marine users.	Benefits outweigh cost/sacrifice.	Yes **C 5.8**
Professional Judgement – Eliminate				
Remove well infrastructure above mudline	F: Yes. CS: Moderate cost	Removal of infrastructure eliminates any potential interactions with commercial fishers, however also eliminates any benefit to these other marine users.	Benefits outweigh cost/sacrifice. Control is also Standard Practice.	Yes **C 6.1**
Establish and maintain a publicly available interactive map which provides updated information on activities being conducted as part of the Petroleum Activities Program	F: Yes. CS: Minimal coast.	Interactive map provides additional/ alternative method for marine users to obtain information on the timing of activities therey reducing the likelihood of interaction with other marine users.	Benefits outweigh cost/ sacrifice.	Yes **C 6.2**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[20]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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				
No additional controls identified				
Professional Judgement – Engineered Solution				
Over-trawl protection on subsea infrastructure.	F: Yes. Over-trawl protection could mitigate against the potential for commercial fishing trawl gear to damage subsea infrastructure and/or result in loss of trawl gear. CS: Significant additional cost.	Reduce the potential for snagging of trawl nets if a wellhead is left in situ following abandonment during drilling. However, given there is no currently active trawling fisheries occurring in the PAA, the benefit is low.	Disproportionate. Significant additional costs.	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 the physical presence of the MODU, project vessels and subsea infrastructure on other users, such as commercial fisheries and shipping. 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 on other users is unlikely to result in potential impact greater than localised impacts to commercial fishing and shipping. 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 requirements of Australian Marine Orders, and expectations of AMSA and AHS provided in consultation with relevant persons or organisations.				

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[20]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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 Petroleum Activities Program to a level that is broadly acceptable.				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 5 Undertake the Petroleum Activities Program in a manner that does not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.	**C 5.1** Vessels to adhere to the navigation safety requirements including the Navigation Act 2012 and any subsequent Marine Orders.	**PS 5.1** Activity support vessels and MODU compliant with Navigation Act and Marine Order 21 (Safety of navigation and emergency procedures) 2012	**MC 5.1.1** Marine assurance inspection records demonstrate compliance with standard maritime safety procedures
	C 5.2 Establishment of a 500 m petroleum safety zone around MODU (and decommissioning vessel if required) and communicated to marine users.	**PS 5.2** No entry of unauthorised vessels within the 500 m safety exclusion zone.	**MC 5.2.1** Records demonstrate breaches by unauthorised vessels within the petroleum safety zone are recorded.
			MC 5.2.2 Consultation records demonstrate that AHO has been notified prior to commencement of the activity to allow generation of navigation warnings (Maritime Safety Information Notifications (MSIN) and Notice to Mariners (NTM) (including AUSCOAST warnings where relevant)), which communicate safety exclusion zones to marine users.
	C 5.3 Mooring systems (chains/wires and anchors) will be removed	**PS 5.3** Mooring systems (chains/wires and anchors) removed during the	**MC 5.3.1** Records demonstrate

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
		Petroleum Activity Program	mooring systems removed.
	C 5.4 Australian Hydrographic Office (AHO) will be notified of activities and movements no less than four working weeks prior to commencement of the Petroleum Activities Program.	**PS 5.4** Notification to AHO of activities and movements to allow generation of navigation warnings (MSIN and NTM) (including AUSCOAST warnings where relevant)).	**MC 5.4.1** Consultation records demonstrate that AHS has been notified before commencing an activity to allow generation of navigation warnings (MSIN and NTM (including AUSCOAST warnings where relevant)).
	C 5.5 Notify relevant government departments, fishing industry representative bodies and licence holders of activities 10 days prior to commencement and following completion of activities.	**PS 5.5** Notification to AFMA, CFA, DCCEEW, WAFIC and fishery licence holders 10 days before activity commences, and following completion of activities.	**MC 5.5.1** Consultation records demonstrate that relevant persons have been notified prior to commencement and following completion of activities.
	C 5.6 Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities and movements 24 to 48 hours before operations commence.	**PS 5.6** Notification to AMSA JRCC to prevent activities interfering with other marine users. AMSA's JRCC will require the MODU's details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start and end.	**MC 5.6.1** Consultation records demonstrate that AMSA JRCC has been notified prior to commencement of the activity within required timeframes.
	C 5.7 Notify relevant persons for activities within the Petroleum Activities Program that commence more than a year after EP acceptance.	**PS 5.7** Relevant persons will be notified no less than four working weeks prior to scheduled activity commencement date where activities and movements are to	**MC 5.7.1** Records demonstrate relevant persons have been consulted.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
		commence more than a year after EP acceptance.	
	C 5.8 Notify Defence of activities no less than five weeks before the scheduled activity commencement date. This will include confirmation of any restricted airspace.	**PS 5.8** Notification to Defence five weeks prior to the scheduled commencement date.	**MC 5.8.1** Records demonstrate that Defence has been notified prior to commencement of the Petroleum Activities Program within the required timeframes and confirmation of any restricted airspace. .
EPO 6 Prevent adverse interactions with other marine users during the PAP or from continued presence of well infrastructure.	**C** 6.1 Remove well infrastructure above the mudline.	**PS 6.1** Well infrastructure above the mudline will be removed	**MC 6.1.1** Seabed clearance survey demonstrates well infrastructure above the mudline has been removed
	C 6.2 Establish and maintain a publicly available interactive map which provides updated information on activities being conducted as part of the Petroleum Activities Program.	**PS 6.2** Activity interactive map established and maintained throughout activities.	**MC 6.2.1** Records demonstrate interactive map was available publicly throughout the activities.

6.7.6 Physical Presence – Disturbance to Benthic Habitat from MODU Anchoring, Drilling Operations, Geotechnical and Geophysical Surveys, Subsea Installation and ROV Operations

Context		
Relevant Activities Drilling Activities - **Section 3.6** Survey activities – **Section 3.6.6** ROV operations – **Section 3.9.8**	**Existing Environment** Physical environment – **Section 4.4** Habitats and Biological Communities – **Section 4.5** Values and sensitivities – **Section 4.6.5**	**Consultation** 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***
Disturbance to seabed from drilling operations	X			X			A	E	-	-	LCS GP	Broadly Acceptable	EPO 6, 7
Placement and retrieval of seabed transponders	X			X			A	E					
Disturbance to seabed as a result of geotechnical activities	X			X			A	F					
Disturbance to seabed from mooring installation	X			X			A	E					
Disturbance to seabed from ROV operation	X			X			A	E					
Disturbance to seabed from cutting and removal of infrastructure and wellheads including mud mats for equipment laydown.	X			X			A	E					

Description of Source of Impact

Mooring Installation

The proposed development well is planned to be drilled using a moored 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 to 12-point pre-laid mooring system, depending on the time of year. Suction piling may be required for installing the anchors.

Although the exact anchoring configurations are currently unknown, a radius of approximately 3,000 m has been assessed, 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 will impact on receptors through direct contact between the seabed and the anchor and anchor chain, resulting in alteration of benthic habitat and localised and temporary increases in suspended sediments. Physical impacts to seabed properties and benthic populations may include smothering and scouring, burial and mortality of benthic fauna, increased sedimentation; and formation of mounds and trenches (Miller et al., 2013; Cordes et al., 2016).

Overall, mooring installation activities will result in localised, small scale seabed disturbance relating to the benthic habitats described in **Section 4.5**.

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 well location due to the installation of the BOP and conductor.

The generation and discharge of cuttings and drilling fluids are not considered in this section; refer to **Section 6.7.8** for an assessment of drill cuttings and drilling fluids.

The planned anchoring activities will 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 undertaken by vessels and floating facilities (excluding FPSOs and FLNGs) while undertaking petroleum activities including:

- locations of water depth greater than 70 m; this boundary is set to exclude areas of sensitive marine primary producer habitats (e.g. corals, seagrass) that occur in shallower waters
- 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.

Underwater Transponders

An array of transponders is proposed within a radius of ~500 m from the proposed location of the well and is anticipated to be in place for a period of about three months. Transponders may be moored to the seabed either by a clump weight or mounted on a seabed frame. A typical seabed frame is 1.5 m × 1.5 m × 1.5 m in dimension. 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.

Geotechnical Activities

The geotechnical site survey will be performed using standard industry equipment and will consist of *in situ* testing to ground truth the geophysical data and provide geotechnical data to characterise the geology of the seabed as described in **Section 3.8.2**. This will include penetration testing, box coring and drop/piston coring and may result in a total estimated seabed disturbance of ~5.5 m^2***.***

Penetration testing comprises of pushing a penetrometer (probe) into the seabed at a constant rate of penetration, and continuously measuring resistance, friction and water pressure. This is undertaken using various equipment and methods, including PCPT, TBT and BPT (see **Section 3.8.1**).

When the required final penetration depth is reached, all equipment is withdrawn from the seabed. A small hole will remain in the seabed, which will eventually collapse and infill as surface sediments move in the ocean current. Up to 16 PCPT, TBT and BPTprofiles will be undertaken within the PAA. The penetration tests will utilise a form of seabed frame to drill through, the size of this will vary but will result in an estimated seabed disturbance of approximately 5 m^2.

Approximately 15 piston cores to depths of ~3 m are proposed to be taken across the Survey Operational Area. Each piston core has a diameter of ~10 cm with a footprint of ~0.3 m^2 resulting in a maximum total footprint of 4.5 m^2 (based on 15 cores).

Anchor/Chain Hold Testing

Anchor/chain hold testing, including placement of anchors and chain/wire on the seabed, dragging during tensioning and recovery of anchors/chain, will result in localised seabed disturbance. Up to 10 locations may be tested using a fifteen tonne anchor, and a section of chain alone. Therefore, up to 20 anchor/chain tests may be conducted within the PAA. The length of the anchor chain used for the tests will be approximately 1,000 m.

Seabed disturbance from anchor/chain hold testing may impact on receptors through direct contact between the seabed and the anchor and chain, resulting in alteration of benthic habitat and localised and temporary increases in suspended sediments. Physical impacts to seabed properties and benthic populations may include smothering and scouring, burial and mortality of benthic fauna, increased sedimentation; and formation of mounds and trenches (Miller et al., 2013; Cordes et al., 2016).

Overall, the anchor/chain hold testing activities may result in localised, small scale seabed disturbance relating to the benthic habitats described in **Section 4.5**.

ROV Operations

The use of an ROV during activities as described in **Section 3.9.8** 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 3.10.6**) to create a stable, level surface and reduce the potential for scouring from subsea equipment (e.g. BOP). This will cause localised and temporary impacts to water quality from increased turbidity and may cause localised and temporary impacts to benthic habitats.

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.

Cutting and Removal of Well Infrastructure

Localised seabed disturbance will occur when cutting and removing the wellhead, including the placement of mud mats for equipment laydown. Given cut is planned to be made from within the well below the mudline, disturbance is expected to be minimal.

Contingency Wet Parking

In the event that mud mats are required to be deployed to allow infrastructure to be temporarily wet parked (**Section 3.10**), an additional temporary seabed disturbance of 3.5 m x 3.5 m per mud mat near the location of the well would occur. Mud mats would be recovered following recovery of infrastructure.

Impact Assessment

Potential impacts to environmental values

Epifauna and Infauna

The seabed of the PAA is characterised by sparse marine life dominated by mobile organisms (ERM, 2013). The benthic biota are predominately deposit feeders such as epifauna (living on the seabed): shrimp (crustaceans) and sea cucumbers (echinoderms), and infauna (living within the surface sediments) small, burrowing worms (polychaetes) and crustaceans (ERM, 2013) (**Section 4.5**).

Marine life such as deep water benthic communities epifauna and infauna (living on and in the sediment dominated habitat), may be impacted from the placement of project infrastructure (i.e. wellhead), or placement of temporary supporting infrastructure (anchors, ROV) 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 sediment coating resulting from elevated turbidity/ total suspended solids (TSS) potentially causing clogging or damage to the physiological functioning of certain biota (sea pens, polychaetes) reliant on external respiratory and feeding structures. Secondary impacts may include alterations to epifauna and infauna community changes (Newell et al., 1998).

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). As such the anchor disturbance to the seabed is determined to be minor and temporary.

Habitat modification as a result of seabed disturbance could occur within a localised radius of the well and geotechnical activities, benthic communities in this area may be reduced or altered, leading to a highly localised impact to any epifauna and infauna benthic communities present.

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 the clogging of respiratory and feeding parts (turbidity) of filter feeding organisms. However, elevated turbidity would only be expected to be slight and short-term, and is therefore, not expected to have any significant impact to environment receptors.

The use of water jetting to remove marine growth on the wellhead will result in temporary suspension of organic matter and localised increase in turbidity. Water jetting will be limited to what is necessary to clean the wellhead following a period of suspension to allow for P&A.

The cutting and removal of the 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.

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.

Seabed disturbance will be limited to the wellhead (100 m radial distance) and geotechnical physical footprint, a localised area; a small proportion of the benthic habitat and associated communities of the PAA. 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 PAA (ERM, 2013). The epifauna and infauna benthic communities known to exist in the PAA are likely to be well represented elsewhere in the region, with impacts restricted to a highly localised proportion of benthic communities. Any potential impact to epifauna and infauna is likely to be highly localised, and temporary in nature.

KEFs

The Continental Slope Demersal Fish Communities KEF overlaps the PAA and seabed disturbance may lead to a highly localised change in habitat and water quality, which will be short-term in nature. During anchoring activities, there is potential for sediment to be suspended into the water column, which can affect benthic communities through a decrease in water quality or light penetration near the seabed. Given the hydrodynamics in open ocean areas, the area of decreased water quality is expected to be localised and temporary, as sediments would settle out of the water column relatively quickly.

The maximum anchoring footprint is conservatively expected to disturb up to 0.013 km^2 (13,000 m^2) of seafloor. The Continental Slope Demersal Fish Communities KEF covers 33,182.04 km^2 (DCCEEW, n.d.(b)).

Considering the short duration of the activity and minor overlap of the PAA of the KEFs (**Figure 4-10**), potential impacts to the ecological values of the KEFs as a result of the PAA are not expected. Any impact to the benthic habitat of the KEF would be limited to minor and temporary disturbance and are not expected to impact the ecological values as described in **Section 4.7**.

The magnitude of potential impacts to epifauna and infauna from seabed disturbance during activities associated with the Petroleum Activities Program is Slight.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, seabed disturbance from the Petroleum Activities Program will result in localised, slight and short-term impacts to benthic habitat and communities (i.e. Environment Impact – E).

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[21]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
Remove well infrastructure above mudline	F: Yes. CS: Moderate cost	Removal of infrastructure eliminates any potential interactions with commercial fishers, however also eliminates any benefit to these other marine users.	Benefits outweigh cost/sacrifice. Control is also Standard Practice.	Yes **C 6.1**

[21] Qualitative measure

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[21]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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 5.3**
Good Practice				
Subsea infrastructure will be positioned within design footprint to reduce seabed disturbance.	F: Yes. CS: Standard practice.	Ensures risks appropriately addressed for seabed disturbance and use of positioning technology to position infrastructure on the seabed with accuracy will reduce seabed disturbance.	Benefits outweigh cost/sacrifice.	Yes **C 7.1**
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 7.2**
Project-specific 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 7.3**
Environmental monitoring of the seabed prior to, and following the Petroleum Activities Program to assess any impacts to seabed.	F: Yes. CS: Significant. Monitoring of the seabed, particularly the deep waters of the PAA, would have significant additional costs to obtain and analyse data with the spatial resolution to accurately assess changes to the seabed habitat.	Environmental monitoring would not result in any additional information of the seabed above the WLSADS and mooring design analysis. Therefore, no additional reductions in likelihood or consequence would occur.	Control grossly disproportionate. Monitoring will not reduce the consequence or likelihood of any impacts to the seabed, and the cost associated with the level of monitoring required to accurately assess any impacts greatly outweighs the benefits gained.	No
Geotechnical survey activities will not be undertaken outside of the PAA.	F: Yes. CS: None.	The impact will be limited to that assessed and appropriately managed in this EP.	Benefits outweigh cost/sacrifice.	Yes **C 7.4**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[21]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Professional Judgement – Eliminate				
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 the main tool used to guide and manipulate equipment during drilling. ROV usage is already limited to only that required to conduct the work effectively and safely. Due to visibility and operational issues ROV work on or close to the seabed is avoided unless necessary. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Do not complete anchor/chain hold testing for future mooring locations as part of the geophysical/geotechnical scope.	F: No. Anchor/chain hold testing may be required to inform future mooring activities in the area. 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				
No additional controls identified.				
Professional Judgement – Engineered Solution				
No additional controls identified.				

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[21]	**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 of benthic habitat disturbance from MODU station holding, drilling operations, geotechnical/ geophysical survey activities, and ROV operations. 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, disturbance to benthic habitats is unlikely to result in a potential impact greater than a slight and temporary effect on habitat (but not affecting ecosystems function). 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 Woodside's relevant systems and procedures. 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 seabed disturbance to a level that is broadly acceptable.				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 6 Prevent adverse interactions with other marine users during the PAP or from continued presence of well infrastructure	**C** 6.1 Refer Section 6.7.5	**PS 6.1** Refer Section 6.7.5 .	**MC 6.1.1** Refer Section 6.7.5
EPO 7 No impact to benthic habitats greater than a consequence level of E[22] inside the PAA during the Petroleum Activities Program	**C 5.3** Mooring systems (chains/wires and anchors) will be removed	**PS 5.3** Mooring systems (chains/wires and anchors) removed during the Petroleum Activity Program	**MC 5.3.1** Records demonstrate mooring systems removed.
	C 7.1 Subsea infrastructure will be positioned within design footprint to reduce seabed disturbance.	**PS 7.1.1** Infrastructure will be placed within the design footprint within the PAA.	**MC 7.1.1** As built surveys verify location installation of equipment within the design footprint within the PAA.
		PS 7.1.2 Transponder equipment, including clump weights/frames, will be removed at the end of the Petroleum Activity Program	**MC 7.1.2** Records demonstrate removal of transponder equipment.

[22] Defined as "slight and temporary effect on habitat (but not affecting ecosystems function)" as in **Table 2-3**.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	C 7.2 Project specific Basis of Well Design, which includes an assessment of seabed sensitivity.	**PS 7.2.1** MODU/installation vessel well site locations consider seabed sensitivities.	**MC 7.2.1** Records that Basis of Well Design includes the assessment of seabed sensitivities.
	C 7.3 Project specific Mooring Design Analysis.	**PS 7.3** Seabed disturbance from MODU mooring limited to that required to ensure adequate MODU station holding capacity.	**MC 7.3.1** Records demonstrate Mooring Design Analysis completed and implemented during anchor deployment.
	C 7.4 Geotechnical survey activities will not be undertaken outside of the PAA.	**PS 7.4** Geotechnical survey activities are limited to the PAA	**MC 7.4.1** Records confirm location of geotechnical survey activities.

6.7.7 Routine and Non-Routine Discharges: MODU and Project Vessels

Context		
Relevant Activities Project Vessels and Support activities – **Section 3.9**	**Existing Environment** Marine Regional Characteristics – **Section 4.2** Habitats and Biological Communities – **Section 4.4**	**Consultation** 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 sewage, grey water and putrescible wastes to marine environment from MODU and project vessels		X			X		A	F	-	-	LCS	Broadly Acceptable	EPO 8
Routine discharge of deck and bilge water to marine environment from MODU and project vessels		X			X		A	F	-	-			
Routine discharge of brine or cooling water to the marine environment from MODU and project vessels.		X			X		A	F	-	-			

Description of Source of Impact

Vessel and MODU Operations

Sewage, grey water and putrescible wastes

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.

Deck and bilge water

The MODU and project vessels routinely generate/discharge:

- Routine/periodic discharge of relatively small volumes of bilge water. Bilge tanks receive fluids from many parts of the project vessels or MODU. Bilge water can contain water, oil, detergents, solvents, chemicals, particles, biocides and other liquids, solids or chemicals.
- Variable water discharge from MODU/vessel decks directly overboard or via deck drainage systems. Sources could include rainfall events and/or deck activities such as cleaning/wash-down of equipment/decks.

Brine

Reverse osmosis (RO), distillation or desalination plants on board vessels and the MODU use seawater to produce potable and demineralised water; resulting in reject brine (i.e. hypersaline water) that is discharged to the marine environment. The potable water produced is stored in tanks on board.

During the distillation process, relatively small volumes of reject brine is produced and discharged. Reject brine discharge is typically 20 to 50 percent higher in salinity than the intake seawater (depending on the desalination process used) and may contain low concentrations of scale inhibitors and biocides, which are used to avoid fouling of pipework (Woodside, 2014).

Models developed by the US EPA (Frick et al., 2001) for temporary brine discharges from vessels assuming no ocean current (i.e. 0 m/s) found that brine discharges from the surface dilute 40–fold at 4 m from the source. This modelling can be used as an indicator for predicting horizontal attenuation and diffusion of reject brine; and suggests that the salinity concentration drops below environmental impact thresholds within 4 m of the discharge point.

Cooling Water

Seawater is used as a heat exchange medium for cooling machinery engines and other equipment. Seawater is drawn up from the ocean, where it is subsequently de-oxygenated and sterilised by electrolysis (by release of chlorine from the salt solution) and then circulated as coolant for various equipment through the heat exchangers (in the process transferring heat from the machinery), prior to discharge to the ocean. Upon discharge, it will be warmer than the ambient water 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 some instances, fresh water or central cooling systems may be fitted. 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 will be routinely discharged at a temperature expected to be less than 70°C and rates ~50 m³/d.

Environmental risks relating to the unplanned disposal/discharges are addressed in **Section 6.8.5**.

Impact Assessment

Potential impacts to environmental values

Water Quality

Sewage, grey water and putrescible wastes

The principal environmental impact associated with ocean disposal of sewage and other organic wastes (i.e. 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.

Woodside conducted monitoring of sewage discharges at its Torosa-4 Appraisal Drilling campaign which demonstrated that a 10 m³ sewage discharge reduced to about 1% of its original concentration within 50 m of the discharge location. In addition to this, monitoring at distances 50 m, 100 m and 200 m downstream of the platform and at five different water depths confirmed that discharges were rapidly diluted; no elevations in water quality monitoring parameters (e.g. total nitrogen, total phosphorous and selected metals) were recorded above background levels at any station (Woodside, 2011). Mixing and dispersion would be further facilitated in deep offshore waters, consistent with the location of the PAA, through regional wind and large scale current patterns resulting in the rapid mixing of surface and near surface waters where sewage discharges may occur. Studies investigating the effects of nutrient enrichment from offshore sewage discharges indicate that the influence of nutrients in open marine areas is much less significant than that experienced in enclosed areas (McIntyre and Johnston, 1975).

Given the offshore location, any routine and non-routine discharges of sewage and greywater and putrescible wastes from activities associated with the Petroleum Activities Program will result in no lasting change to water quality.

Activities associated with the Petroleum Activities Program will occur over a period of three years (2023-2026), however actual project activities are expected to take up to approximately 52 days in total (~50 days for drilling, appraisal and plug and abandonment activities and ~ 2 days for wellhead decommissioning). Vessels will also be moving (i.e. not in a single location for an extended period of time). Rather, these routine discharges are expected to be intermittent in nature for the duration of the Petroleum Activities Program. Therefore, impacts to water quality within the PAA are expected to be localised with no lasting effect.

Deck and bilge water

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 are expected to rapidly dilute in the water column (Shell, 2010). Discharges will disperse and dilute rapidly, with concentrations significantly dropping with distance from the discharge point.

Bilge water and deck drainage discharges, which may include non-organic contaminants, will rapidly dilute. As such, 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. The involved is located more than 12 nm from land, which exceeds the exclusion zones required by Marine Order 96 (Marine pollution prevention – sewage) 2018 and Marine Order 95 (Marine pollution prevention – garbage) 2013.

Based on the detailed evaluation, the magnitude of potential impact of a change in water quality is no lasting effects.

Brine or cooling water

The key physicochemical stressors that are associated with reject brine and cooling water discharge 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 be limited to 100 m of the source of the discharge where concentrations are highest.

Reject brine water is typically 20 to 50% higher in salinity to the surrounding water and, based on models developed by the US EPA (Frick et al., 2001), discharges of brine water will sink through the water column where it will be rapidly mixed with receiving waters and dispersed by ocean currents, decreasing in salinity rapidly as distance from source increases.

Water quality of the surrounding environment may be altered through the addition of chemicals and an increase in salinity. Scale inhibitors and biocides are commonly used within the systems described above to prevent fouling. Scale inhibitors are typically low molecular weight phosphorous compounds that are water-soluble, and only have acute toxicity to marine organisms about 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).

Generally, reject brine and cooling water containing chemical additives are inherently safe at the low dosages used. They are usually consumed in the inhibition process, so there is little or no residual chemical concentration remaining upon discharge.

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.

Seabirds and Migratory Shorebirds, Fish, Marine Reptiles and Marine Mammals

It is possible that marine fauna transiting the localised area may come into contact with these discharges (e.g. marine turtles, humpback whales, whale sharks; **Section 4.6**) as they traverse the PAA. However, given the localised extent of cumulative impacts from multiple vessel discharges and limited exposure, within the PAA, significant impacts to marine fauna are not expected. In particular, whilst an internesting buffer BIA and an internesting Habitat Critical to the survival of the species for flatback turtles overlap the PAA, no impacts to flatback turtles is expected, given the water depths of the PAA (83 – 258 m), and distance to nesting beaches (~50 km).

Plankton

Research suggests that zooplankton composition and distribution are not affected in areas associated with sewage dumping grounds (McIntyre and Johnston, 1975). Plankton communities are expected to rapidly recover from any such short term, localised impact, as they are known to have naturally high levels of mortality and a rapid replacement rate.

Discharged brine sinks through the water column where it is rapidly mixed with receiving waters and dispersed by ocean currents. As such, any potential impacts are expected to be limited to the source of the discharge where concentrations are highest. Studies indicate that effects from increased salinity on planktonic communities in areas of high mixing and dispersion are generally limited to the point of discharge only (Azis et al., 2003).

Planktonic productivity in the NWMR is low. No significant impacts from the planned routine discharges are expected, 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. The PAA is located more than 12 nm from land, which exceeds the exclusion zones required by Marine Order 96 (Marine pollution prevention – sewage) 2018 and Marine Order 95 (Marine pollution prevention – garbage) 2013.

Based on the impact assessment, the magnitude of the potential impacts on plankton from routine and non-routine brine and cooling water discharges is assessed as no lasting effect.

Cumulative Impacts

Routine and non-routine utility discharges from a MODU and supporting vessels may occur simultaneously, but will dilute rapidly and have negligible cumulative impacts. These discharges may also occur simultaneously with other discharges from the MODU, such as drill cuttings and fluids. Given the rapid dilution of these discharges in the open

water environment, the potential for cumulative impacts to water quality would be restricted to within 100 m of the discharge location. Hence, cumulative impacts will have no lasting effect (i.e. Environment Impact – F).

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that routine or non-routine discharges described will not result in a potential impact greater than localised contamination not significant to environmental receptors, with no lasting effect (i.e. Environment Impact – F).

Demonstration of ALARP

Control Considered	Control Feasibility (F) and Cost/Sacrifice (CS)[23]	Benefit in Impact/Risk Reduction	Proportionality	Control Adopted
Legislation, Codes and Standards				
Marine Order 95 – marine pollution prevention—garbage (as appropriate to vessel class) which requires putrescible waste and food scraps to pass through a macerator so it is capable of passing through a screen with no opening wider than 25 mm.	F: Yes. CS: Minimal cost. Standard practice.	No reduction in likelihood or consequence would result.	Controls based on legislative requirements – must be adopted.	Yes **C 8.1**
Marine Order 96 – marine pollution prevention—sewage (as appropriate to vessel class) which includes the following requirements: • a valid International Sewage Pollution Prevention Certificate, as required by vessel class • a sewage treatment plant approved by AMSA or an issuing body • a sewage comminuting and disinfecting system • a sewage holding tank sized appropriately to contain all generated waste (black and grey water) • discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 nm from the nearest land	F: Yes. CS: Minimal cost. Standard practice.	No reduction in likelihood or consequence would result.	Controls based on legislative requirements – must be adopted.	Yes **C 8.2**

[23] Qualitative measure

• discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant will only occur at a distance of more than 3 nm from the nearest land • discharge of sewage will occur at a moderate rate while survey vessel is proceeding (> 4 knots), to avoid discharges in environmentally sensitive areas.				
Where there is potential for loss of primary containment of oil and chemicals on the MODU, deck drainage must be collected via a deck drainage water management system.	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 8.3**
Marine Order 91 – marine pollution prevention—oil (as relevant to vessel class) requirements, which includes mandatory measures fo r processing oily water prior to discharge: • Machinery space bilge/oily water shall have IMO-approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure Oil in Water (OIW) content to be less than 15 Parts per Million (ppm) prior to discharge. • IMO-approved oil filtering equipment shall also have an alarm and an automatic stopping device or be capable of recirculating if OIW concentration exceeds 15 ppm. • A deck drainage system shall be capable of controlling the content of discharges for areas of high risk of	F: Yes. CS: Minimal cost. Standard practice.	No reduction in likelihood or consequence would result.	Controls based on legislative requirements – must be adopted.	Yes **C 8.4**

fuel/oil/grease or hazardous chemical contamination. • There shall be a waste oil storage tank available, to restrict oil discharges. • If machinery space bilge discharges cannot meet the oil content standard of <15 ppm without dilution or be treated by an IMO-approved oil/water separator, they will be contained on-board and disposed onshore. • Valid International Oil Pollution Prevention Certificate.				
Good Practice				
No additional controls identified.				
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
Storage, transport and treatment/disposal onshore of sewage, greywater, putrescible and bilge wastes.	F: Not feasible. Would present additional safety and hygiene hazards resulting from the storage, loading and transport of the waste material. Distance of activity offshore also makes implementing this control not feasible. CS: Not considered – control not feasible.	Not considered – control not feasible.	Not considered – control not feasible.	No
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 planned routine and non-routine discharges from MODU/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 from the MODU and project vessels are unlikely to result in an impact significance level greater than temporary, with no lasting				

effect. BIAs within the PAA include the flatback turtle internesting, whale shark foraging, pygmy blue whale migration and distribution, and wedge-tailed shearwater breeding and foraging areas. The adopted controls are considered consistent with industry legislation, codes and standards, and professional judgement and meet the requirements of Australian Marine Orders.

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.

Environmental Performance Outcomes, Standards and Measurement Criteria

Outcomes	*Controls*	*Standards*	*Measurement Criteria*
EPO 8 No impact to water quality greater than a consequence level of F[24] from discharge of sewage, greywater, putrescible wastes, bilge and deck drainage to the marine environment during the Petroleum Activities Program.	**C 8.1** Marine Order 95 – Pollution prevention – Garbage (as appropriate to vessel class) which requires putrescible waste and food scraps are passed through a macerator so that it is capable of passing through a screen with no opening wider than 25 mm.	**PS 8.1** MODU and project vessels compliant with Marine Order 95 – Pollution prevention – Garbage.	**MC 8.1.1** Records demonstrate MODU and project vessels are compliant with Marine Order 95 – Pollution prevention (as appropriate to vessel class).
	C 8.2 Marine Order 96 - pollution prevention – sewage (as appropriate to vessel class) which include the following requirements: • a valid International Sewage Pollution Prevention (ISPP) Certificate, as required by vessel class • an AMSA-approved sewage treatment plant • a sewage comminuting and disinfecting system • a sewage holding tank sized appropriately to contain all generated waste (black and grey water) • discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 nm from the nearest land • discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant will only occur at a distance of more than	**PS 8.2** MODU and project vessels compliant with Marine Order 96 – Pollution prevention – Sewage (as appropriate to vessel class).	**MC 8.2.1** Records demonstrate MODU and project vessels are compliant with Marine Order 96 – Pollution prevention – Sewage (as appropriate to vessel class).

[24] Defined as ' Environment – No lasting effect (less than one month); localised impact not significant to environmental receptors.' as in **Table 2-3** / **Section 2.6.3.**

	3 nm from the nearest land • discharge of sewage will occur at a moderate rate while support vessel is proceeding (more than 4 knots), to avoid discharges in environmentally sensitive areas.		
	C 8.3 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 8.3** Contaminated drainage contained, treated and/or separated prior to discharge.	**MC 8.3.1** Records demonstrate MODU has a functioning bilge/oily water management system.
	C 8.4 Marine Order 91 – oil (as relevant to vessel class) requirements, which include mandatory measures for the processing of oily water prior to discharge: • Machinery space bilge/oily water shall have International Maritime Organisation (IMO) approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure Oil in Water (OIW) content to be less than 15 ppm prior to discharge. • IMO approved oil filtering equipment shall also have an alarm and an automatic stopping device or be capably of recirculating in the event that OIW concentration exceeds 15 ppm. • A deck drainage system shall be capable of controlling the content of discharges for areas of high risk of fuel/oil/grease or hazardous chemical contamination. • There shall be a waste oil storage tank available, to restrict oil discharges. • In the event that machinery space bilge discharges cannot meet the oil content standard of less than 15 ppm without dilution or	**PS 8.4** Discharge of machinery space bilge/oily water will meet oil content standard of <15 ppm without dilution.	**MC 8.4.1** Records demonstrate discharge specification met for MODU and project vessels.

	be treated by an IMO approved oil/water separator, they will be contained on-board and disposed of onshore. • Valid International Oil Pollution Prevention Certificate.		

6.7.8 Routine and Non-Routine Discharges: Drill Cuttings, Drilling Fluids and Well Removal Fluids

Context		
Relevant Activities Drilling Activities – **Section 3.6** Optional Decommissioning Activities – **Section 3.6.6** Contingent Activities – **Section 3.10**	**Existing Environment** Marine Regional Characteristics – **Section 4.2** Habitats and Biological Communities – **Section 4.5** Protected Species – **Section 4.6**	**Consultation** 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	X	X		X			A	E	-	-	GP PJ	Broadly Acceptable	EP O 9
Routine discharge of drilling muds (WBM) to the seabed and the marine environment	X	X		X				E					
Routine discharge of treated NWBM drill cuttings to the marine environment	X	X		X				E					
Non-routine discharge of wash water from mud pits and vessel tank wash fluids	X	X		X				E					
Routine discharge of well clean-out fluids	X	X		X				E					
Non-routine discharge of well annular fluids	X	X		X				E					
Routine and non-routine discharge of drilling cuttings and fluids to the marine environment from geotechnical survey equipment	X	X		X				F					
Non-routine discharge of WBM and cement cuttings to the marine environment during drilling out of a cement plug	X	X		X				F					

Non-routine discharge of grit and flocculant during removal of well infrastructure	X	X		X				F					

Description of Source of Impact

Drilling Operations

One appraisal well is planned to be drilled during the Petroleum Activities Program at a depth of ~163 m, over a period of approximately 50 days (including drilling, appraisal and plug and abandonment). 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
- well abandonment and use of fluids (subsea control, completions and well annular fluids).

Drilling activities are described in Section 3.6.1. The well will be drilled as a series of sections, as detailed in **Table 6-14**. It is intended that 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:

- Water based muds (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.
- Non-water based muds (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 6-14** represent the worst case for a single well section.

Table 6-14: Indicative drill cuttings and fluid volumes for the Julimar South-1 appraisal well

Well Section	Discharge Point	Drilling Fluid Type	Approx. Interval Length (m)	Approx. Cuttings Volume Discharged (m^3)	Approx. Fluid Volume (m^3)
42" Conductor Hole	Seabed	Seawater (SW) / pre-hydrated bentonite sweeps (PHB)	72	65	880
26" Surface Hole	Seabed	SW / PHB / WBM / PAD	744	255	2800**
17-1/2" Hole	Surface (-1 m MSL)	WBM	396	62	1450
12-1/4" Hole	Surface (-1 m MSL)	WBM	573	44	1020
8 ½" x 9 7/8" Open Hole	Surface (-1 m MSL)	WBM	336	17	970
Total per well				**443**	**7120**
Contingency Side Track				*121*	*2000*

** Includes drilling 60 m with PAD
MSL – metres below sea below.
Not all fluid will be discharged after each section – options for reuse during batch drilling will be explored

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 a 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 a 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 6-14** to re-drill the same sections of the respudded well.

Sidetrack

The option of a sidetrack instead of a respud may be determined, if operational issues are encountered. Should a sidetrack be required, it will result in an increase in the volume of cuttings generated and a potential increase in the use of NWBM. Additional drill cuttings volumes are estimated in **Table 6-14**.

Geotechnical surveys

Drilling fluid will be used during geotechnical operations. The base fluid will consist of seawater and may include drilling fluid additives as described in **Section 3.6.1.5**. All drilling fluids used during the drilling process will be discharged from the borehole at the seabed including small amounts of excess fluid which may be produced. Volumes of excess drilling fluid will be limited as fluids are mixed for use on an as needs basis.

The drilling process generates a small quantity of drill cuttings which are removed from the borehole by the drilling fluid and discharged at the seabed. The cuttings are pieces of the material being drilled and range from clay particles to small fragments of rock.

Sampling boreholes drilled to recover soil and rock samples generate minimal drill cuttings as the objective is to recover a continuous sample profile of the depth of the borehole. Drill cuttings may be generated from approximately 16 PCPT profiles (up to 40 mm in diameter and 20 m below seabed), depending on the method of coring, 16 TBT or BPT (up to 250 mm in diameter and 20 m below seabed) box cores at approximately 12 locations (with a sample recovery volume of approximately 0.125 m3) within the PAA.

Permanent Plugging Program and Removal of Well Infrastructure

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). For Julimar South-1, drilled cement cuttings will also be produced during permanent plugging activities. 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 6.7.9** for cement, cementing fluids and subsea control fluids. For the purposes of this impact assessment, the indicative dimensions, discharge locations and approximate volumes are provided in **Table 6-15.**

Table 6-15: Estimated discharges of solids and volumes of drilling fluids used for the PAA.

Description	Discharge Point	Discharge	Approximate Solids Discharged	Approximate Fluid Discharged	Potential Additional Solids	Potential Additional Fluid Discharge

Drill out cement plug	Below sea level	WBM and cement cuttings	2 m^3	1 m^3	0 m^3	0 m^3
Kill well	Below sea level	Well kill fluid	0 m^3	0 m^3	0 m^3	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 m^3	600 m^3	0 m^3	0 m^3
Milling (potential activity using WBM)	Below sea level	WBM, swarf, cement and formation rock	0 m^3	0 m^3	14t (swarf) 6 m^3 (cement) 8 m^3 (formation rock)	1600 m^3
Milling (potential activity using NWBM)	Below sea level	NWBM, swarf, cement and formation rock	0 m^3	0 m^3	14t (swarf) 6 m^3 (cement) 8 m^3 (formation rock)	5 m^3
Mechanical cutting	Within the well, below the mudline	Metal and cement cuttings from well infrastructure and lubrication for the cutting tool.	0 m^3	0 m^3	Negligible volumes may be release 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 t (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 release 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 6-15**. 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 6.7.9.**

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

During permanent plugging activities, wells 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 throughwell 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

During permanent plugging activities, 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

The planned cutting depth for removal of the wellhead is approximately 3-5 m below the mudline. Discharges from cutting of well infrastructure using either an abrasive water jet cutting method of a mechanical cutting tool are therefore expected to be confined predominately within the well and settle on the top of the permanent plug. During final cut through the conductor pipe, small amounts of flocculant and grit will be released below the mudline to sediments immediately surrounding the well.

Should cutting at a shallower depth be required, these discharges may be released to the seabed surface. For the mechanical cutting tool, discharges will be limited to small quantities of metal and cement cuttings from the infrastructure itself as well as small quantities of lubricant. For the abrasive water jet cutting method, discharges include a small amount of grit and flocculant. Depending on the cutting depth, pressure from the jet cutting could push some of the material up to the seabed surface causing localised smothering of benthic communities as well as create localised and temporary increases in turbidity around the well.

Impact Assessment

Potential impacts to environmental values

Routine and non-routine drilling-related discharges may result in the 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 (83 - 258 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 the drilling of the well.

Top-hole well section drill cuttings and drilling fluids (WBM) will be discharged at the seabed. The coarser material (drill cuttings) will deposit on the seabed and the finer sediment material (the WBM) will cause localised elevated TSS in the water column above the seabed surrounding the well. This reduction in water quality will be temporary (limited to the operational discharges during drilling) and subject to rapid dispersion and dilution by prevailing seabed currents.

During bottom-hole well sections, when drill cuttings with retained drilling fluids (WBM) are discharged below the water line (from the MODU), the larger particles, representing about 90% of the mass of the solids, form a plume that drops out of suspension in the water column rapidly and, deposits on the seabed. About 10% of the mass of the solids (the fines predominately composed of drilling fluid) form a plume in the upper surface layer (depending on the depth of discharge from the MODU) that will be transported by prevailing currents away from the MODU and is diluted rapidly in the receiving waters (Neff 2005, 2010). There is a large body of knowledge indicating a discharge of cuttings with adhered fluids diluting rapidly, finding that within 100 m of the discharge point, a drilling cuttings and fluid plume released at the surface will have diluted by a factor of at least 10,000. Further to that, Neff (2005) states that in well mixed oceans waters, the plume is diluted by more than 100-fold within 10 m of the discharge site.

Dispersion of the cuttings plume is influenced by a number of factors: particle sized distribution of the cuttings and fluids, operational discharge events and rates and metocean conditions such as ocean current speed. The case studies described in Neff (2005) used WBMs and surface current speeds of 0.15–0.3 m/s. As currents in the PAA are expected to be within this range, and WBMs (bulk discharge) will contribute the largest input to elevated TSS/turbidity during drilling discharges, the dispersion extent as determined by Neff (2005) is considered representative for the Julimar South-1 drilling program.

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 decommissioning operations. In addition, due to the open nature of the marine environment of the PAA and associated environmental conditions (i.e. windy, strong currents, etc.), the content and dispersive nature of drilling muds within the marine environment and the high population replenishment of these organisms, it is expected that impacts to plankton species will be limited to within tens of metres of the discharge point and return to previous conditions within a relatively short period of time. On this basis, the impacts to plankton from routine and non-routine discharges during drilling activities is slight.

Sediment Quality and Benthic Communities

Accumulation of drill cuttings, grit and flocculent on the seabed causes changes in the physical properties of the seabed sediment such as the particle size distribution (PSD), the introduction of contaminants (metals such as barium) from retained drilling fluids (WBM) and associated ecological effects.

The discharge of drill cuttings and unrecoverable fluids at the seabed during riserless top hole drilling results in a localised area of sediment deposition (known as a cuttings pile) surrounding the well site. The cuttings pile distribution may reflect prevailing seabed currents and spread predominately downstream of the well site but overall extent from the well site is typically tens of metres. The dimensions of the cuttings pile depend on several factors, including volume (approximately 300 m^3 of top hole cuttings ;**Table 6-7**) 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 3.6.1.6** 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 500 m^3; **Table 6-14**) 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 (predominately drilling fluids) dispersed over a greater distance from the discharge site, typically several kilometres but with no associated ecological effects.

Benthic organisms below the cuttings pile will be buried and smothered; however, the cuttings pile is expected to be recolonised over time. Ecological impacts to benthic biota are predicted when sediment deposition is equal to or greater than 6.5 mm in thickness (IOGP, 2016). This amount of sediment deposition from top hole and bottom hole cuttings is expected to be confined to within a few hundred metres around the well location, although this depends on the nature of the cuttings, the water depth and currents of the receiving environment (IOGP, 2016). A conservative radius of 500 m representing a zone of potential ecological impact has been applied to the 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. The zone of potential ecological impact is conservatively estimated to be 0.8 km^2.

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 the well site). Low levels of sediment deposition away from the immediate area of the 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 location, (83 – 258 m), in the offshore, open water environment and >50 km from the nearest shore. 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 Julimar South-1 well is located outside the boundaries any KEF, and is more than 3.5 km from both the Ancient Coastline and the Continental Slope Demersal Fish Communities KEFs. Therefore potential impacts to the values of the KEFs are highly unlikely to be impacted by drilling cuttings discharges.

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 may 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 (83 – 258 m). Impacts beyond the 500 m zone of ecological impact for each well as described for drill cuttings and retained fluids discharge is not expected.

Subsea – Displacement, Completion and Well-bore Cleanout Fluids

Discharges such as displacement, completion and wellbore cleanout fluids are typically inert and of low-toxicity. These fluids are mostly brine, with a small proportion of chemical additives such as surfactants, biocide, corrosion inhibitor, oxygen scavenger, MEG and guar gum. The volume of one wellbore and subsequent discharge volume would be ~400 m^3. Any change to water quality is expected to be localised and temporary. Rapid dilution due to prevailing ocean currents in the open water environment would lead to any changes in water quality such as low toxicity contaminants being temporary (only for the duration of the discharge) and reducing water quality within a short distance of the discharge location.

Removal (Cutting) of Well Infrastructure

The planned cutting depth is approximately 3-5 m below the mudline, therefore discharges from cutting of well infrastructure using either an abrasive water jet cutting method of a mechanical cutting tool are expected to be confined predominately within the well and settle on the top of the permanent plug. During final cut through the conductor pipe, small amounts of flocculent and grit will be released below the mudline to sediments immediately surrounding the well.

Should cutting at a shallower depth be required, however, these discharges may be released to the seabed surface. For the mechanical cutting tool, discharges will be limited to small quantities of metal and cement cuttings from the infrastructure itself as well as small quantities of lubricant. For the abrasive water jet cutting method, discharges include a small amount of grit and flocculent. Depending on the cutting depth, pressure from the jet cutting could push some of the material up to the seabed surface causing localised smothering of benthic communities as well as create localised and temporary increases in turbidity around the well.

All chemicals used for infrastructure removal are assessed in accordance with the Woodside Chemical Selection and Assessment Environment Guideline.

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)**[25]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
No additional controls identified.				
Good Practice				
Drilling and completions fluids will have an environmental assessment completed 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 9.1**
For project activity fluids, periodic chemical reviews are performed.	F: Yes. CS: Minimal cost. Standard practice.	Regular reviews will ensure chemicals selected for drilling fluids remain ALARP.	Benefits outweigh cost/sacrifice.	Yes **C 9.2**
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 9.3**

[25] Qualitative measure

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[25]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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 9.4**
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 9.5**
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 9.6**
Displacement, brine, workover or intervention fluids contaminated with hydrocarbons will be treated prior to discharge or containment. If discharge specification not met the fluid will be returned to shore.	F: Yes. CS: Minimal cost. Standard practice.	Ensuring <1% oil content will provide a small reduction in consequence when fluids are discharged to the environment.	Benefits outweigh cost/sacrifice.	Yes **C 9.7**
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 9.8**
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	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 9.9**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[25]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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.				
Professional Judgement – Eliminate				
No additional controls identified				
Professional Judgement – Substitute				
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 9.10**
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 9.11**
Drill cuttings returned to the MODU will be discharged below the water line.	F: Yes. CS: Minimal cost. Standard practice.	Discharge of drill cuttings below the water line will reduce carriage and dispersion of cuttings thereby reducing the consequence of cuttings discharges during the Petroleum Activities Programme.	Benefits outweigh cost/sacrifice.	Yes **C 9.12**
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	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

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[25]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
discharge from the MODU (below the water line).				
Riserless Mud Recovery (RMR) system to return top hole cuttings from the riserless section of the well to the MODU prior to transport to an alternative discharge location or back to shore for disposal.	F: Not technically feasible due to water depth. CS: Not considered – control not feasible.	Not considered – control not feasible.	Not considered – control not feasible.	No
Return riser-in-place cuttings for disposal at another marine location or onshore for processing and land disposal (skip and 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 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	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 each 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 to the risks introduced by cuttings relocation (including if an alternative system which doesn't use transport containers was implemented).	No

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[25]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	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.			
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	Not considered – control not feasible.	Not considered – control not feasible.	No

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[25]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	size of hole drilled while still being able to reach the targets and meet development objectives safely. CS: Not considered – control not feasible.			
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 personnel on board 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 outweigh benefit to be gained in the context of existing environment (deep water, open ocean communities with no proximity to sensitive benthic communities or receptors). Although adoption of this control could be used to verify EPOs associated with drilling mud and cutting discharge, alternative controls identified achieve an 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.	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)[25]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	CS: The primary cost/sacrifice of this option is the monetary outlay for acquisition and implementation which is estimated at $800,000 to mobilise, install and demobilise, along with a running cost of about $32,000/day. Other factors considered include: • 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.			

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[25]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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
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), 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.				
Environmental Performance Outcomes, Standards and Measurement Criteria				
Outcomes	***Controls***	***Standards***	***Measurement Criteria***	
EPO 9 No impact to water quality or marine biota greater than a consequence level of E[26] from discharging drilling cuttings or fluids during the	**C 9.1** Drilling and completions fluids will have an environmental assessment completed prior to use.	**PS 9.1** All chemicals intended or likely to be discharged into the marine environment reduced to ALARP using the chemical assessment process.	**MC 9.1.1** Records demonstrate chemical selection, assessment and approval process for selected chemicals is followed.	
	C 9.2	**PS 9.2** Acceptability of previously approved chemicals are re-	**MC 9.2.1** Records confirm periodic reviews have	

[26] Defined as "Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes." as in **Table 2-3**.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
Petroleum Activities Program.	For project activity fluids, periodic chemical reviews are performed.	evaluated to ensure ALARP and alternatives are considered.	taken place, and any actions/changes are being tracked to closure.
	C 9.3 Written NWBM justification process followed.	**PS 9.3** NWBMs only used where written justification process has been followed.	**MC 9.3.1** Records show NWBM justification process has been followed and NWBM only used where technically required.
	C 9.4 NWBM base oils selected based on expected toxicity.	**PS 9.4** Group III base oils used in NWBM.	**MC 9.4.1** Records demonstrate that only Group III base oils used in NWBM.
	C 9.5 Backload bulk NWBM or maintain on rig for re-use	**PS 9.5** No overboard disposal of bulk NWBM	**MC 9.5.1** Incident reports of any unplanned discharges of NWBM
	C 9.6 Bulk operational discharges conducted under MODU's permit to Work (PTW) system (to operate discharge valves/pumps).	**PS 9.6** Increased level of assurance and verification on bulk operational discharges.	**MC 9.6.1** Records demonstrate that bulk discharges are conducted under the MODU PTW system.
	C 9.7 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 9.7** Achieve less than 1% by volume oil content before discharge.	**MC 9.7.1** Records demonstrate contaminated fluids were less than 1% by volume oil content before discharge.
	C 9.8 SCE used to treat NWBM cuttings prior to discharge.	**PS 9.8** Average OOC (sections using NWBM only) discharge limit of 6.9% or less oil on wet cuttings is achieved.	**MC 9.8.1** Records confirm the average OOC for the entire well (sections using NWBM only) do not exceed limit.
	C 9.9 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,	**PS 9.9** 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 9.9.1** 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.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	measurement of OOC to occur more frequently from shakers		
	C 9.10 Mud pit wash residue will be measured for oil content prior to discharge.	**PS 9.10** Achieve less than 1% by volume oil content before discharge	**MC 9.10.1** Records 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 9.11 WBM drill cuttings that are returned to the MODU will be processed (using SCE equipment).	**PS 9.11** WBM drill cuttings that are returned to the MODU processed using SCE equipment allowing reuse of mud prior to discharge.	**MC 9.11.1** Records demonstrate that operational SCE is in use.
	C 9.12 Drill cuttings returned to the MODU will be discharged below the water line.	**PS 9.12** Cuttings discharged below the water line	**MC 9.12.1** Records confirm cuttings discharge chute/line below the water line.

6.7.9 Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids and Unused Bulk Product

Context		
Relevant Activities Drilling Activities – **Section 3.6** Optional Decommissioning Activities – **Section 3.6.6** Contingent Activities – **Section 3.10**	**Existing Environment** Marine Regional Characteristics – **Section 4.2** Habitats and Biological Communities – **Section 4.5** Protected Species – **Section 4.6**	**Consultation** 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.	X	X		X			A	E	-	-	GP PJ	Broadly Acceptable	EP O 10
Routine discharge of subsea well fluids (inc. BOP and well construction activity control fluids).	X	X		X			A	E	-	-			
Non-routine discharge of unused bulk products	X	X		X			A	E	-	-			

Description of Source of Impact

Cement, Cementing Fluids, Grout, Subsea Well Fluids and Unused Bulk Products

Cementing Fluids, Cement and Grout

Cementing fluids, including cementing mix water, may require discharge to the marine environment under various scenarios.

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 the 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 44 m^3 (based on up to four cement jobs x 11 m^3 discharged per job). 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 m³) 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 cement (dry bulk, after well operations are completed) will either be: used for subsequent works; provided to the next operator at the end of the drilling program (as it remains on the rig); or if these options are not practicable, discharged to the marine environment as dry bulk or as a slurry. The process that will be followed to determine discharge is the last option is presented in **Figure 6-1.**

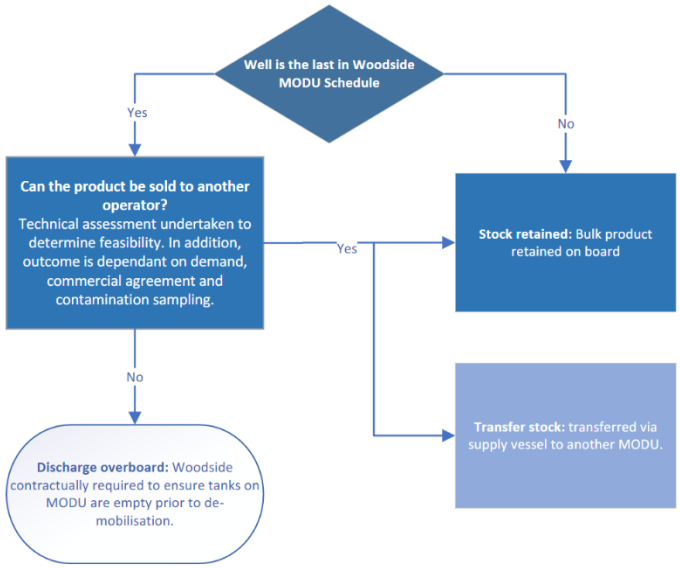


Figure 6-1: Management process for excess bulk product

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 3.9.1**. 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.

Other unused bulk products

Additional products such as barite and bentonite may be discharged in bulk during or at the end of the activity if they cannot be reused or taken back to shore (refer to the process that will be followed to determine discharge is the last option is presented in **Figure 6-1**). Use and discharge of all chemicals and products will be conducted in line with Woodside's internal guidelines (**Section 3.9**). Discharge may be in the form of dry bulk or as a slurry; however, discharges will not be contaminated with hydrocarbons. Discharges may be ~75 tonnes of cement, 150 tonnes of barite and 100 tonnes of bentonite. However, these volumes are conservative (50% greater than the minimum required storage volumes) and discharge volumes (if required) are likely to be much smaller.

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 KEF overlaps the PAA, (**Section 4.7**), however impacts to values and sensitivities of these KEF are not expected due to the highly localised and 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*** Impacts of cement on the marine environment are predominantly associated with localised burial of benthic biota in the direct physical footprint of deposition. Cement operations 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 about 5 and 50 ppm with the horizontal and vertical extents of the plume ~150 m and 10 m, respectively (BP Azerbaijan, 2013). Five hours after ceasing the discharge, modelling indicates that the plume will have dispersed to concentrations <5 ppm. Cement is the most common material currently used in artificial reefs around the world and is inert. The potential for toxicity is associated with chemical additives that may be added to cement mixtures. Therefore, the toxicity associated with the discharge of cement is limited to the subsurface release of cement (not discharge of slurrified or dry cement). Once the cement has hardened, chemical additives are locked into the cement (Terrens et al., 1998) and not expected to pose any toxicological risk to benthic biota from leaching or direct contact. Most cement discharges that will occur during the drilling activities will be at the seabed during cementing of the casing. Once overspill from cementing activities hardens, the physical sediment properties of the area directly adjacent to the well (10–50 m) will be permanently altered (Terrens et.al., 1998). The potential disturbance area is an estimated 0.007 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 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 localised impact. ***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 localised. Given the highly localised nature of these discharges and potential impacts, cumulative impacts to marine biota, water quality and sediments are not expected.
Summary of Potential Impacts to environmental values(s)
The overall impact significance level for routine and non-routine discharges of cement, cementing fluids, subsea well fluids and unused bulk product is E based on slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**

	Cost/Sacrifice (CS)[27]			
Legislation, Codes and Standards				
No additional controls identified				
Good Practice				
Subsea control and cementing fluids and additives will have an environmental assessment completed 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 10.1**
For project activity fluids, periodic chemical reviews are performed.	F: Yes. CS: Minimal cost. Standard practice.	Regular reviews will ensure chemicals selected for drilling and completions fluids remain ALARP.	Benefits outweigh cost/sacrifice.	Yes **C 9.2**
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 9.6**
Displacement, brine, workover or intervention fluids contaminated with hydrocarbons will be treated prior to discharge or contained. If discharge specification not met the fluid will be returned to shore.	F: Yes. CS: Minimal cost. Standard practice.	Ensuring <1% oil content will provide a small reduction in consequence when fluids are discharged to the environment.	Benefits outweigh cost/sacrifice.	Yes **C 9.7**
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.	Not considered, control not feasible.	Not considered, control not feasible.	No

[27] Qualitative measure

	CS: Not considered, control not feasible.			
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: • significant risks with tank high pressure differentials to transfer material onshore • high risk with the vessel to waste truck transfer due to tank corrosion concerns and pressure relief valve issues. CS: Not considered. Control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Options for use of excess bulk cement, bentonite and barite will be managed as per **Figure 6-1** and only discharged to the marine environment as a last option.	F: Yes. However, the cement may not meet the required technical specifications, and hence not be usable. CS: Minor.	Using excess bulk cement for subsequent works would eliminate the bulk discharge of cement to the marine environment and eliminate the consequence of impacts from such activities.	Benefits outweigh cost/sacrifice	Yes **C 10.2**
Return bulk unused inhibited MEG/brine package for onshore disposal where possible	F: Yes. CS: Minor	Transfer of excess MEG/brine package for 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 10.3**
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
No additional controls identified				

ALARP Statement

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of cement, cementing fluids, subsea well fluids and unused bulk products. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.

Demonstration of Acceptability

Acceptability Statement

The impact assessment has determined that, given the adopted controls, cement, cementing fluids, subsea well fluids and unused bulk products discharges are unlikely to result in an impact greater than slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes. Further opportunities to reduce the impacts have been investigated above. The adopted controls are considered good practice.

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.

Environmental Performance Outcomes, Standards and Measurement Criteria

Outcomes	*Controls*	*Standards*	*Measurement Criteria*
EPO 10 No impact to water quality or marine biota greater than a consequence level of E[28] from discharging cement, cementing fluids, subsea well fluids and unused bulk products during the Petroleum Activities Program.	**C 10.1** Subsea control and cementing fluids and additives will have an environmental assessment completed prior to use.	**PS 10.1** All chemicals intended or likely to be discharge into the marine environment reduced to ALARP using the chemical assessment process.	**MC 10.1.1** Records demonstrate chemical selection, assessment and approval process for selected chemicals is followed.
	C 9.2 **See Section 6.7.8**	**PS 9.2** **See Section 6.7.8**	**MC 9.2.1** **See Section 6.7.8**
	C 9.6 **See Section 6.7.8**	**PS 9.6** **See Section 6.7.8**	**MC 9.6.1** **Section 6.7.8**
	C 9.7 **See Section 6.7.8**.	**PS 9.7** **See Section 6.7.8**	**MC 9.7.1** **See Section 6.7.8**
	C 10.2 Options for use of excess bulk cement, bentonite and barite will be managed as per **Figure 6-1** and only discharged to the marine environment as a last option.	**PS 10.2** No bulk cement, bentonite or barite discharged without documented ALARP assessment	**MC 10.2.1** Records demonstrate that, prior to discharge of excess bulk cement, bentonite or barite options for use were assessed.
	C 10.3 Unused MEG/brine will be returned to port/staging point for disposal where possible.	**PS 10.3** Return all unused MEG/Brine for onshore disposal where possible.	**MC 10.3.1** Records demonstrate all unused MEG/brine returned to shore for disposal where possible.

[28] Defined as “Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.” as in **Table 2-3**

6.8 Unplanned Activities (Accidents, Incidents, Emergency Situations)

6.8.1 Quantitative Spill Risk Assessment Methodology

6.8.1.1 Quantitative Hydrocarbon Spill Modelling

Quantitative hydrocarbon spill modelling was performed by RPS, on behalf of Woodside, using a three-dimensional hydrocarbon spill trajectory and weathering model, SIMAP (Spill Impact Mapping and Analysis Program). The model is designed to simulate the transport, spreading and weathering of specific hydrocarbon types under different environmental conditions (both meteorological and oceanographic). Near-field subsurface discharge modelling was performed using OILMAP, which predicts the droplet sizes that are generated by the turbulence of the discharge as well as the centreline velocity, buoyancy, width and trapping depth (if any) of the rising gas and oil plumes. The OILMAP output parameters were used as input into SIMAP.

The algorithms in the SIMAP model are based on the best available scientific knowledge and are updated when necessary in response to significant advances in knowledge. Recent improvements have been implemented to the entrainment algorithm, which have been adjusted to implement the findings of published data based on field research performed during the Macondo spill event in the Gulf of Mexico (Spaulding et al., 2017; Li et al., 2017; French McCay et al., 2018).

Stochastic modelling was conducted for this study, which compiled data from numerous hypothetical spill simulations (100 for condensate and 200 for diesel) under different environmental conditions to determine the widest extent of possible oil dispersion. The environmental conditions for each of the hypothetical spills 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 simulations that show something unusual or unexpected make an important contribution to the overall outcomes and fate of the hydrocarbon.

The model simulates surface releases and uses the unique physical and chemical properties of a representative 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. The model also calculates the accumulation of hydrocarbon mass that arrives on each section of shoreline over time, taking into account any mass that is lost to evaporation and/or subsequent removal by current and wind forces.

All hydrocarbons spill modelling assessments performed 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.

The physical characteristics of Julimar condensate, along with marine diesel, as used in the hydrocarbon spill modelling studies, are provided in Table 6-16**.**

Table 6-16: Julimar South-1 hydrocarbon characteristics used in oil spill modelling.

Hydrocarbon Type	Initial Density (g/cm^3)	Viscosity (cP)	Component BP (°C)	Volatiles <180 °C	Semi volatiles 180–265 °C	Low Volatility (%) 265–380 °C	Residual (%) >380 °C	Aromatic (%) of whole oil <380 °C BP
				Non-Persistent			Persistent	
JULA-01/02/04 condensate	0.798 @ 15°C	1.39 @ 20°C	% of total	43.6	22.9	27.1	6.5	19.9
			% aromatics	78.8	5.1	6.0	-	-
Marine diesel	0.829 @ 25°C	4.0 @ 25°C	% of total	6.0	34.6	54.4	5.0	3.0
			% aromatics	1.8	1.0	0.2	-	-

6.8.1.2 Worst-case Scenario

In assessing the potential impacts of an unplanned hydrocarbon release, representative worst-case scenarios (in terms of volume and location) were assessed. A summary of the credible hydrocarbon spill scenarios that could occur during Julimar drilling are provided in Table 6-17.

Table 6-17: Credible hydrocarbon spill scenarios

Scenario	Hydrocarbon type	Maximum credible volume	Location
Vessel collision resulting in rupture of a tank	MDO	2000 m^3	Well Location
Loss of well integrity	Condensate	54,520 m^3	Well location
Loss of containment during bunkering	MDO	50 m^3	Within PAA

For the Petroleum Activities Program, the worst-case scenario was identified to be a loss of 54,520 m^3 in the event of a loss of well containment resulting in an uncontrolled surface release for five days, followed by a 72-day uncontrolled seabed release. As the worst-case scenario, the following assessment of impacts will also address the potential impacts of other credible lesser releases.

An instantaneous release of 2000 m^3 of marine diesel following a collision between a Well Intervention Vessel and a refuelling vessel, representing loss of the largest vessel fuel tank integrity following a collision (refuelling vessel), was also used to inform this EP. Previous modelling was available for a similar spill scenario of the same release volume and hydrocarbon type at a similar location (<5 km away at the Julimar manifold). This modelling is therefore an analogous assessment of the vessel collision scenario presented in this EP, and hence has been adopted.

The assessment of impacts from these worst case scenarios will also address the potential impacts of other credible lesser releases.

6.8.1.3 Environment that May Be Affected and Hydrocarbon Contact Thresholds

The outputs of the quantitative hydrocarbon spill modelling are used to assess the environmental risk, if a credible hydrocarbon spill scenario occurred, by delineating which areas of the marine environment could be exposed to hydrocarbon levels exceeding hydrocarbon threshold concentrations. The summary of all the locations where hydrocarbon thresholds could be exceeded by any of the simulations modelled is defined as the 'environment that may be affected' (EMBA). In this case, the EMBA is driven by a combination of the worst-case credible hydrocarbon spill scenario, which, in this instance, is the loss of 54,520 m^3 in the event of a loss of well containment, as well as a loss of 2000 m^3 of marine diesel in the event of a vessel collision. At points, the marine diesel EMBA, extends further than the loss of well containment EMBA due to hydrocarbon characteristics.

As the weathering of different fates of hydrocarbons (surface, entrained and dissolved) differs due to the influence of the metocean mechanism of transportation, the EMBA combines the potential spatial extent of the different fates.

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. The EMBA therefore represents the total extent of all the locations where hydrocarbon thresholds could be exceeded from all modelling runs.

Surface and accumulated shoreline hydrocarbon concentrations are expressed as grams per square metre (g/m²), with entrained and dissolved aromatic hydrocarbon concentrations expressed as parts per billion (ppb). A conservative approach adopting accepted contact thresholds that are documented to impact the marine environment are used to define the EMBA. These hydrocarbon thresholds are presented in Table 6-18 and described in the following subsections.

Woodside recognises that hydrocarbons may be present beyond the ecological impact EMBA at low concentrations that may be visible but are not expected to cause ecological impacts. The threshold for visible surface oil (1 g/m^2) has therefore been used to define an additional boundary within which socio-cultural impacts to the visual amenity of the marine environment may occur. This area is referred to as the socio-cultural EMBA. Any ecological impacts from dissolved and entrained hydrocarbons above prescribed thresholds, as in Table 6-18, may also result in socio-cultural impacts. Potential impacts to socio-cultural values assessed within these EMBAs include:

- protected areas
- national and Commonwealth Heritage Listed places
- tourism and recreation
- fisheries.

Table 6-18: Summary of environmental impact thresholds applied to the quantitative hydrocarbon spill risk modelling results

Hydrocarbon Type	EMBA				Socio-cultural EMBA	
	Surface Hydrocarbon (g/m^2)	Entrained hydrocarbon (ppb)	Dissolved aromatic hydrocarbon (ppb)	Accumulated hydrocarbons (g/m^2)	Surface Hydrocarbon (g/m^2)	Accumulated hydrocarbons (g/m^2)
Condensate	10	100	50	100	1	10
Diesel	10	100	50	100	1	10

6.8.1.4 Surface Hydrocarbon Threshold Concentrations

The spill modelling outputs defined the EMBA for surface hydrocarbons resulting from a spill (contact on surface waters) using a threshold of ≥10 g/m² for diesel. This threshold is used to define an area within which ecological impacts to the marine environment may occur from surface hydrocarbons. It represents the minimum oil thickness (0.01 mm) at which ecological impacts (e.g. to birds and marine mammals) are expected to occur.

Thresholds for registering biological impacts resulting from contact of surface slicks have been estimated by different researchers at about 10–25 g/m² (French et al., 1999; Koops et al., 2004; National Oceanic and Atmospheric Administration, 1996). Potential impacts of surface slick concentrations in this range for floating hydrocarbons may include harm to seabirds through

ingestion from preening of contaminated feathers, or the loss of the thermal protection of their feathers. The 10 g/m² threshold is the reported level of oiling to instigate impacts to seabirds and is also applied to other wildlife, though it is recognised that 'unfurred' animals, where hydrocarbon adherence is less, may be less vulnerable. 'Oiling' at this threshold is taken to be of a magnitude that can cause a response from the most vulnerable wildlife such as seabirds. Due to weathering processes, surface hydrocarbons are expected to have a lower toxicity due to change in their composition over time. Potential impacts to shoreline sensitive receptors may be markedly reduced in instances where there is extended duration until contact.

A surface threshold of 10 g/m² represents a 'dull metallic colour' (Bonn Agreement, 2015) (Table 6-19). A lower concentration of 1 g/m² is used to define an area within which social-cultural impacts to the visual amenity of the marine environment may occur. The surface threshold of ≥1 g/m² is based on the relationship between film thickness and appearance (Bonn Agreement oil appearance code, 2015), and represents a 'rainbow sheen' appearance. This threshold is considered below levels which would cause ecological impacts, and instead represents potential for visual amenity impacts. This threshold area is referred to as the 'socio-cultural EMBA'.

Table 6-19: The Bonn Agreement oil appearance code

Appearance (following Bonn visibility descriptors)	Mass per area (g/m²)	Thickness (µm)	Volume per area (L/km²)
Discontinuous true oil colours	50 to 200	50 to 200	50,000 to 200,000
Dull metallic colours	5 to 50	5 to 50	5000 to 50,000
Rainbow sheen	0.30 to 5.00	0.30 to 5.00	300 to 5000
Silver sheen	0.04 to 0.30	0.04 to 0.30	40 to 300

6.8.1.5 Accumulated Hydrocarbon Threshold Concentrations

Owens and Sergy (1994) define accumulated hydrocarbon <100 g/m² to have an appearance of a stain on shorelines. French-McCay (2009) defines accumulated hydrocarbons ≥100 g/m² to be the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat. A threshold of ≥100 g/m² has been adopted as the threshold for shoreline accumulation and has been included in the EMBA. Further, any ecological impacts at the shoreline accumulation threshold may also result in socio-cultural impacts.

6.8.1.6 Dissolved Aromatic Hydrocarbon Threshold Concentrations

Dissolved hydrocarbons present a narcotic effect resulting from uptake into the tissues of marine organisms. This effect is additive, increasing with exposure concentration or with time of exposure (French-McCay, 2002; NRC, 2005). The dissolved aromatic threshold of 50 ppb has been selected as a medium level threshold to approximate the potential toxic effects, particularly sublethal effects to sensitive species, as consistent with the NOPSEMA Oil Spill Modelling Guidance Bulletin (NOPSEMA, 2019).

6.8.1.7 Entrained Hydrocarbon Threshold Concentrations

This threshold is used to define an area within which ecological impacts to the marine environment may occur from entrained hydrocarbons. Therefore, it may also be associated with socio-cultural impacts.

Entrained hydrocarbons present a number of possible mechanisms for toxic exposure to marine organisms. The entrained hydrocarbon droplets may contain soluble compounds, hence have the potential for generating elevated concentrations of dissolved aromatic hydrocarbons (e.g. if mixed by breaking waves against a shoreline). Physical and chemical effects of the entrained hydrocarbon droplets have also been demonstrated through direct contact with organisms; for example, through

physical coating of gills and body surfaces, and accidental ingestion (National Research Council, 2005).

The entrained threshold has been selected to be consistent with the NOPSEMA Oil Spill Modelling Guidance Bulletin (NOPSEMA, 2019). An entrained threshold of 100 ppb is considered to be appropriate given the oil characteristics for informing potential impacts to receptors.

6.8.1.8 Scientific Monitoring

A planning area for scientific monitoring is also described in Section 5.8 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 NOPSEMA Bulletin #1 Oil Spill Modelling (2019).

A scientific monitoring program would be activated following a Level 2 or 3 unplanned hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors. This would consider receptors at risk (ecological and socio-economic) for the entire predicted EMBA and in particular, any identified Pre-emptive Baseline Areas (PBAs) for the worst-case credible spill scenario(s) or other identified unplanned hydrocarbon releases associated with the operational activities.

6.8.2 Unplanned Hydrocarbon Release: Loss of Well Control

Context		
Relevant Activities Drilling Activities – **Section 3.6** Contingent Activities – **Section 3.10**	**Existing Environment** Physical Environment – **Section 4.4** Habitats and Biological Communities – **Section 4.5** Protected Species – **Section 4.6** Socio-economic Environment – **Section 4.9**	**Consultation** 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***
Loss of hydrocarbons to marine environment due to loss of well containment	X	X	X	X	X	X	B	B	1	M	LCS GP PJ RBA CV SV	Acceptable if ALARP	EPO 11

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. 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 that two well blowout scenarios:

1. “Kick” blowout - ~ 10 m into the reservoir whilst landing in the 12.25” hole section

2. “Swab” blowout – full reservoir open to flow in the 8.5” hole section

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

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 the Julimar South-1 Petroleum Activities Program is an uncontrolled subsea release to environment lasting ~77 days. This time frame 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); and
- 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 Julimar South-1 condensate characteristics **Table 6-16**. The modelled release rate provided assumes the worst case scenario for the largest oil volume release (**Table 6-20**). 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 6-20: Summary of modelled credible scenario – well blowout

	Loss of well integrity
Total discharge[29] at surface	~5 days 3,023 m³
Total discharge at seabed	~72 days 51,497 m³
Water depth	163 m
Fluid	Julimar South-1 condensate

Hydrocarbon characteristics

Julimar South-1 Condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporative conditions, about 43.6% of the oil mass should evaporate within the first 12 hours (BP < 180°C); up to a further 22.9% could evaporate within the first 24 hours (180°C < BP < 265°C); and a further ~27.1% should evaporate over several days (265°C < BP < 380°C). Approximately 6.5% 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 19.9% by mass of whole oil. Around 8.8% by mass is highly soluble and highly volatile. A further ~11.1% 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.

Weathering processes under realistic variable wind conditions are illustrated in the example mass balance weathering graph for a discrete spill of 50 m³ of Julimar South-1 condensate released at the surface, which is considered informative for this scenario (**Figure 6-2**Error! Reference source not found.). The graph demonstrates that the majority of evaporation would take place within the first 24 hours, with about35.8% of oil mass is forecast to have entrained and a further ~55.5% is forecast to have evaporated in the first 12 hours, leaving <~1% of oil floating on the water surface. The residual compounds will tend to remain entrained beneath the surface under conditions that generate wind waves (>6m/s).

During calm conditions, approximately 65% of 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.

[29] The discharge volumes in Table 6-20 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.

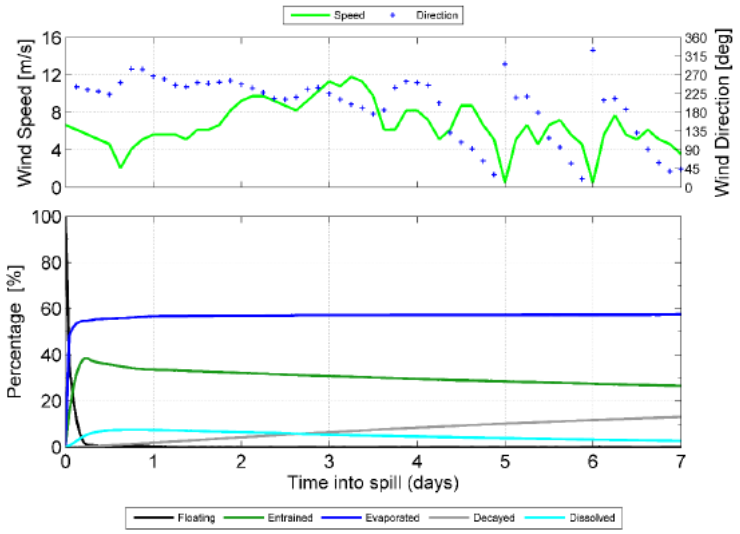


Figure 6-2: Proportional mass balance plot representing the weathering of 50 m^3 from a surface spill of JULA-01/02/04 condensate spilled onto the water surface and subject to variable wind at 27°C water temperature and 25°C air temperature.

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 3.2 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 42 m.

The high discharge velocity and turbulence generated by the expanding gas plume is predicted to generate droplet sizes ranging from 627 µm to 2,259 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 and have been used to define the EMBA (**Sections 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 are forecast to potentially occur up to 37 km from the release site. There is no contact with receptors from surface oil concentrations greater than the 10 g/m^2 threshold. The Montebello AMP is the only receptor with surface hydrocarbons above the 1 g/m^2 threshold (**Table 6-21**), with a 5% probability of contact above the threshold.

Entrained Hydrocarbons

Entrained hydrocarbons at concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 449 km from the release site. Contact by entrained hydrocarbons at concentrations equal to or greater than 100 ppb is predicted at the Montebello AMP (79%), as well as several other sensitive receptors with probabilities of less than 50% (**Table 6-21**). The maximum entrained hydrocarbons concentration forecast for any receptor is predicted to be 2,098 ppb at Montebello AMP.

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbons at concentrations equal to or greater than the 50 ppb thresholds are predicted to be found up to around 500 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 (71%), as well as several other sensitive

receptors with probabilities of less than 50% (**Table 6-21**). The maximum dissolved aromatic hydrocarbon concentration forecast for any receptor is predicted as 1,549 ppb at Montebello AMP.

Accumulated Hydrocarbons

The potential for accumulation of oil on shoreline, occurring above thresholds concentrations (100 g/m^2), was not predicted at any receptor groups (**Table 6-21**). The maximum accumulated volume at shoreline concentrations of 10-100 g/m^2 is 7 m^3 at the Exmouth, Ningaloo World Heritage and Ningaloo State Marine Park receptor groups. No receptors were predicted to be contacted by shoreline oil above 1000 g/m^2 (<1% probability).

Table 6-21: Key receptor locations and sensitivities potentially contacted above impact thresholds by the loss of well containment scenario 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																						Socioeconomic and Cultural					Socio-cultural EMBA		Ecological EMBA			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*				*Other Communities / Habitats*						*Protected Species*								*Other Species*							Surface hydrocarbon (1-10 g/m^2)	Accumulated hydrocarbons (10–100 g/m^2)	Surface hydrocarbon (≥10 g/m^2)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m^2)
		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[30]	Argo-Rowley Terrace AMP	✓						✓						✓	✓			✓			✓	✓	✓		✓			✓		-	-	-	1	-	-
	Ashmore Reef AMP (including Cartier Island AMP)	✓	✓	✓				✓		✓				✓				✓	✓		✓	✓	✓	✓		✓	✓	✓		-	1	-	-	-	-
	Montebello AMP	✓	✓	✓			✓	✓						✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		5	-	13	79	71	-
	Ningaloo AMP	✓	✓	✓			✓	✓						✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	33	14	
	Shark Bay AMP	✓	✓					✓		✓				✓		✓		✓		✓		✓	✓	✓		✓	✓			-	1	-	-	-	-
	Gascoyne AMP	✓	✓											✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	-	33	10	-
	Rankin Bank	✓	✓	✓			✓	✓		✓					✓				✓		✓		✓	✓	✓		✓			-	-	8	-	21	-
Islands	Dampier Archipelago	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	-	3	-	-	-	-

[30] 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																					Socioeconomic 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 (1-10 g/m^2)	Accumulated hydrocarbons (10–100 g/m^2)	Surface hydrocarbon (≥10 g/m^2)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m^2)
		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*										
	Montebello Islands (including State Marine Park, Hermite Islands)	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		-	24	13	22	8	-
	Barrow Island (including State Nature Reserves, State Marine Park and Marine Management Area and Boodie and Middle Islands and NR)	✓	✓	✓	✓		✓	✓			✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	17	-	34	13	-
	Pilbara Islands – Southern Islands (Great Sandy, North Sandy, Airlie, Passage, Peak, Serrurier, Thevenard and Bessieres Islands – including State Nature Reserves)	✓	✓		✓		✓		✓		✓		✓		✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		-	5	-	27	10	-

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																			Socioeconomic and Cultural					Socio-cultural EMBA		Ecological EMBA			
		Water Quality	Sediment Quality	Marine Primary Producers				Other Communities / Habitats						Protected Species								Other Species							Surface hydrocarbon (1-10 g/m²)	Accumulated hydrocarbons (10–100 g/m²)	Surface hydrocarbon (≥10 g/m²)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m²)
		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)						
Mainland (nearshore waters)	Muiron Islands (WHA, State Marine Park)	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓		-	13	-	31	4	-
	Lowendal Islands	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓		-	5	-	3	3	-
	Middle Pilbara – Islands and Shoreline	✓	✓	✓		✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	4	-	-	-	-
	Ningaloo Coast (North, Middle & South; WHA, and State Marine Park)	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	11	-	33	14	-
	Exmouth – (Exmouth, Exmouth Gulf West, South East)	✓	✓		✓		✓					✓			✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓			-	11	-	15	5	-
	Cape Range NP										✓	✓	✓	✓					✓				✓		✓			✓	✓		-	11	-	14	5	-
Reefs, Banks	Glomar Shoals	✓	✓	✓			✓			✓												✓		✓	✓	✓					-	-	-	-	2	-

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																				Socioeconomic and Cultural					Socio-cultural EMBA		Ecological EMBA			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*				*Other Communities / Habitats*						*Protected Species*								*Other Species*								Surface hydrocarbon (1-10 g/m²)	Accumulated hydrocarbons (10–100 g/m²)	Surface hydrocarbon (≥10 g/m²)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m²)
		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)*						
	Rowley Shoals– Mermaid Reef, Clerke Reef & Imperieuse Reef State Marine Parks	✓	✓	✓	✓		✓	✓		✓	✓	✓				✓			✓	✓		✓	✓	✓	✓			✓	✓		-	5	-	-	-	-
	Montebello Shoals	✓	✓	✓			✓	✓			✓				✓	✓			✓	✓	✓	✓		✓	✓						-	-	-	-	4	-
	Barrow Island Reefs and Shoals (including Poivre Reef and Tryal Rocks)	✓	✓	✓			✓	✓			✓				✓	✓			✓	✓	✓	✓		✓	✓						-	-	-	32	30	-
	Pilbara Reefs (including Outtrim Patches, Penguin Bank, Ripple and Rosily Shoals)	✓	✓	✓			✓	✓			✓				✓	✓			✓	✓	✓	✓		✓	✓						-	-	-	28	11	-
	Ningaloo Reef	✓	✓	✓			✓	✓			✓				✓	✓			✓	✓	✓	✓		✓	✓						-	-	-	-	5	-

Summary of Potential Impacts to environmental values(s)	
Summary of Potential Impacts to protected species	
Setting	***Receptor group***
Offshore	***Cetaceans*** 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, 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). 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). This may result in the irritation of sensitive membranes such as the eyes, mouth, digestive and respiratory tracts, and organs. Other potential impacts include impairment of the immune system, neurological damage (Helm et al. 2015), reproductive failure, other adverse health effects (e.g. lung disease, poor body condition), and mortality (DHNRDT 2016). Physical contact with hydrocarbons is likely to have biological consequences for these species. Given cetaceans maintain thick skin and blubber, external exposure to hydrocarbons may result in irritation to skin and eyes. Hydrocarbons may also be ingested, particularly by baleen whales (e.g. pygmy blue whales and humpback whales), which feed by filtering large volumes of water. Geraci (1988) has identified behavioural disturbance through avoidance of spilled hydrocarbons in several species of cetacean, suggesting that cetaceans have the ability to detect surface slicks. However, observations during spills have recorded larger whales (both mysticetes and odontocetes) and smaller delphinids travelling through and feeding in oil slicks. During the Deepwater Horizon spill, cetaceans were routinely seen swimming in surface slicks offshore and nearshore (Aichinger Dias et al. 2017). 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). Cetacean populations that are resident within the EMBA may be susceptible to impacts from spilled hydrocarbons if they interact with an area affected by a spill. Such species are more likely to occupy coastal waters (refer to the Mainland and Islands section below for additional information). Suitable habitat for oceanic toothed whales (e.g. sperm whales) and dolphins is broadly distributed throughout the region and as such, impacts are unlikely to affect an entire population. Other species identified in **Section 4.6.3** may also have possible transient interactions with the EMBA. Pygmy blue whales and humpback whales are known to migrate seasonally through the wider EMBA and a migration BIA for the pygmy blue whale overlaps the PAA. A potential major spill in May to November would coincide with humpback whale migration through the waters off the Pilbara and North West Cape (**Section 4.6.5**). A major spill in April–August or October would coincide with pygmy blue whale migration (**Section 4.6.5**). Both pygmy blue and humpback whales are baleen whales, so are most likely to be significantly impacted by toxic effects when feeding. However, feeding during migrations is low level and opportunistic, with most feeding for both species occurring in the Southern Ocean. Fresh hydrocarbons (i.e. typically in the vicinity of the release location) may have a higher potential to cause toxic effects when ingested, while weathered hydrocarbons are considered to be less likely to result in toxic effects. As such, the risk of ingestion of hydrocarbons is low. Pygmy blue whale and humpback whale migrations are protracted through time and space (i.e. the whole population will not be within the EMBA), and as such, a spill from the loss of well integrity is unlikely to affect an entire population. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-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. Potential impacts to inshore cetaceans and other marine mammals are discussed in the Mainland and Islands (nearshore) impacts discussion below.

Marine Turtles

Adult sea turtles exhibit no avoidance behaviour when they encounter hydrocarbon spills (NOAA 2010). Therefore, contact with surface slicks or entrained hydrocarbon can result in hydrocarbons adhering to body surfaces (Gagnon and Rawson 2010) causing irritation of mucous membranes in the nose, throat and eyes, leading to inflammation and infection (NOAA 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 includes an increase in the production of white blood cells, and even a short exposure to hydrocarbons may affect the functioning of the salt gland (Lutcavage et al. 1995).

Hydrocarbons in surface waters may also impact turtles when they surface to breathe as they may 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 (NOAA 2010). Contact with entrained hydrocarbons can result in hydrocarbons adhering to body surfaces, causing irritation of mucous membranes in the nose, throat and eyes and leading to inflammation and infection (Gagnon and Rawson 2010).

An internesting BIA and internesting Habitat Critical for flatback turtles overlaps the PAA (**Table 4-17**). However, 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 (~83 - 258 m). There are significant nesting and foraging sites along the mainland coast and islands of the region, including Dampier Archipelago and the Montebello Islands, and a number of BIAs and Habitat Criticals' overlap the EMBA (**Section 4.6.2, Figure 4-5, Figure 4-6**).

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 Petroleum Activities Program is proposed to be undertaken in about Q1 2023, which coincides with the peak hatching season of several species (November to April), where higher numbers of turtles may be present (refer to **Section 4.6.5**). Oil from an ongoing loss of containment could be present during nesting season depending on the timing of a spill.

In summary, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to offshore foraging marine turtles, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions. Potential impacts to nesting marine turtles are discussed in the Mainland and Islands (nearshore) impacts discussion below.

Sea Snakes

Impacts to sea snakes from direct contact with hydrocarbons are likely to result in similar physical effects to those recorded for marine turtles. This may include potential damage to the dermis and irritation to the mucus membranes of the eyes, nose and throat (ITOP, 2011a). They may also be impacts 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, sea snakes are found in continental shelf waters around offshore islands and potentially submerged shoals (water depths <100 m). It is acknowledged that sea snakes may be present in the wider EMBA. Their abundance is not expected to by high given the water depth and offshore environment.

Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to offshore sea snakes, with consequence severity dependent on the duration and extent of a spill in relation to the distribution of sea snakes. Potential impacts to inshore and offshore reef associated sea snakes are discussed below.

Fish, Sharks and Rays

Hydrocarbon contact may affect whale sharks through ingestion of entrained or dissolved hydrocarbons, particularly if feeding. Whale sharks may transit offshore open waters when migrating to and from Ningaloo Reef, where they aggregate for feeding from March to July (see Mainland and Islands (nearshore waters) below).

Whale sharks are known to feed in the PAA and EMBA, and both areas overlap the whale shark foraging BIA identified in **Section 4.6.2**, within which whale sharks are seasonally present between April and October (**Section 4.6.5**). The EMBA also overlaps a Great White Shark foraging BIA, ~920

	km south of the PAA. Impacts to sharks and rays may occur through direct contact with hydrocarbons, or through contamination of the tissues and internal organs, either through direct contact or through 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 via coating of the gills inhibiting gas exchange. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to offshore shark, sawfish and ray species, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions. Potential impacts to inshore and offshore reef associated sharks, sawfish and rays are discussed in the Submerged Shoals and Banks and Mainland and Islands (nearshore) impacts discussion below.
	Seabirds and Migratory Shorebirds Offshore waters are potential foraging grounds for seabirds associated with the coastal roosting and nesting habitat (e.g. Ningaloo, Muiron Islands and the Barrow/Montebello/Lowendal Island Group). There are confirmed foraging grounds off Ningaloo and the Barrow/Montebello/Lowendal Island Group. Foraging and breeding BIAs for a number of seabirds and migratory shorebirds overlap with the EMBA (**Section 4.6.4).** In particular, the EMBA overlaps a number of significant habitats for seabirds and migratory shorebirds including the Abrolhos Islands (~908 km south of the PAA), an internationally important breeding site (DBCA, 2021), as well as the Dampier Archipelago and Pilbara Islands. Seabirds and migratory birds are particularly vulnerable to contact with floating hydrocarbons, which may mat feathers. This may lead to hypothermia from loss of insulation, and to ingestion of hydrocarbons when preening to remove hydrocarbons; both impacts may result in mortality (Hassan and Javed 2011). Seabirds generally do not exhibit avoidance behaviour to floating hydrocarbons. Physical contact of seabirds with surface slicks is by several exposure pathways—primarily immersion, ingestion, and inhalation. Such contact with hydrocarbons may result in (AMSA 2013, International Petroleum Industry Environmental Conservation Association [IPIECA] 2004): • plumage fouling and hypothermia (loss of thermoregulation) • decreased buoyancy and consequent increased potential to drown • inability to fly or feed • anaemia • pneumonia, and • irritation of eyes, skin, nasal cavities and mouths. Longer-term exposures may potentially impact seabird populations through loss of reproductive success, malformation of eggs or chicks (AMSA 2013), or mortality of individuals from oiling of feathers or the ingestion of hydrocarbons. 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. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to offshore seabirds and migratory shorebirds, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions. Potential impacts to coastal and offshore island associated birds are discussed in the Mainland and Islands (nearshore) impacts discussion below.
Submerged Shoals and Banks	***Marine Turtles*** There is the potential for marine turtles to be present at submerged shoals such as Rankin Bank and Glomar Shoals, however these receptors are not expected to be contacted by entrained hydrocarbons above the threshold concentration. Submerged reefs and shoals of Barrow Island and southern Pilbara islands have the potential to be contacted by entrained hydrocarbons above the threshold concentrations. Marine turtles may be present at such reefs and shoals given the benthic communities associated with the areas. Therefore, a worst case hydrocarbon spill scenario has the potential to result in major long-term impacts to foraging marine turtles, the consequence severity dependent on the actual timing, duration and extent of a spill in relation to species migratory movements and distributions, Potential impacts to

	nesting and internesting marine turtles are discussed in the Mainlands and Islands (nearshore) impacts below.
	Sea Snakes There is the potential for sea snakes to be present at submerged shoals Rankin Bank and Glomar Shoals, as well as the submerged reefs and shoals of Barrow Island and southern Pilbara islands which have the potential to be contacted by entrained hydrocarbons above the threshold concentrations. The potential impacts of exposure are as discussed in Offshore – Sea snakes. 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 worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to offshore reef associated sea snakes, with consequence severity dependent on the duration and extent of a spill in relation to the distribution of sea snakes. Potential impacts to inshore sea snakes are discussed in the Mainlands and Islands (nearshore) impacts section below.
	Sharks, Fish and Rays There is the potential for resident shark, ray and fish populations to be impacted directly from hydrocarbon contact, or indirectly through contaminated prey, or loss of habitat. Spill model results indicate Rankin Bank and Glomar Shoals are not predicted to be contacted by entrained hydrocarbons above threshold concentrations). Submerged reefs and shoals of Barrow Island and southern Pilbara islands have the potential to be contacted by entrained hydrocarbons above the threshold concentrations. Shark and ray species that have associations with submerged shoals may be more susceptible to a reduction in habitat quality resulting from a hydrocarbon spill. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to offshore reef associated shark, ray and fish species, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions. Potential impacts to inshore associated sharks, sawfish and rays are discussed in the Mainland and Islands (nearshore) impacts discussion below.
Mainland and Islands (Nearshore Waters)	***All Species*** The information provided on protected species in this section is in addition to that provided in the preceding Offshore and Submerged Banks and Shoals sections. Refer to these preceding sections for additional discussion of protected species.
	Cetaceans and Dugongs In addition to a number of whale species that may occur within the EMBA (refer to **Section 4.6.3** for the full list of EPBC listed cetacean species identified by the PMST with potential to occur within the EMBA), coastal populations of small cetaceans and dugongs are known to reside or frequent nearshore waters, including the Ningaloo Coast, Exmouth Gulf, Muiron Islands, Montebello/Barrow/ Lowendal Islands Group and Pilbara Southern Island Group (see **Table 6-21**). which may be potentially impacted by entrained 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 (~182 km south of the PAA); therefore, migratory humpbacks moving into the Gulf, or more residential dugongs, may be exposed to entrained hydrocarbons above thresholds levels. However, entrained 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 as discussed previously in Offshore – Cetaceans. 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.

	Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to inshore 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 Turtles Several marine turtle species use nearshore waters and shorelines for foraging and breeding (including internesting), with significant nesting beaches along the mainland coast and islands in potentially impacted locations such as the Dampier Archipelago, Montebello/Barrow/Lowendal Islands Group, Pilbara Islands and Ningaloo Reef. A number of BIAs have been identified for marine turtles, including nesting, internesting and foraging areas as discussed previously in Offshore – Marine Turtles. There are distinct breeding seasons, as detailed in **Section 4.6.5**. The nearshore waters of these turtle habitat areas may be exposed to entrained hydrocarbons exceeding the threshold concentration. In addition, The potential for accumulation of oil on shoreline, occurring above thresholds concentrations (100 g/m^2), was not predicted at any receptor group (see **Table 6-21**). The potential impacts of exposure are as discussed previously in Offshore – Marine Turtles. In the nearshore environment, turtles can ingest hydrocarbons when feeding (e.g. on oiled seagrass stands/macroalgae) or can be indirectly affected by loss of food source (e.g. seagrass due to dieback from hydrocarbon exposure) (Gagnon and Rawson 2010). In addition, hydrocarbon exposure can impact turtles during the breeding season at nesting beaches. Contact with gravid adult females or hatchlings may occur on nesting beaches (accumulated hydrocarbons) or in nearshore waters (entrained hydrocarbons) where hydrocarbons are predicted to make shoreline contact. If accumulated hydrocarbons (Montebello Islands and Ningaloo Coast) or entrained hydrocarbons reach the shoreline or internesting coastal waters (refer to **Table 6-21** for receptor locations), there is the potential for impacts to turtles using the affected area. Animals that lay eggs have been shown to pass metabolised oil related compounds into their offspring which has the potential to be toxic to the developing embryos. Similarly, adult female turtles can pass metabolised oil and related products to their eggs, thereby potentially exposing developing embryos and impairing the development and survival of embryos (DWH Natural Resource Damage Assessment Trustees, 2016). During the breeding season, turtle aggregations near nesting beaches within the EMBA are most vulnerable due to greater turtle densities and potential impacts may occur at the population level. Potential impacts on marine turtles may be major and long-term in the unlikely event of a loss of well control. However, based on the assessment above and given the volatile and non-persistent nature of the hydrocarbons and low levels of shoreline accumulation, the extent of impacts is not expected to result in a threat to the overall viability of marine turtle populations in the wider region. A worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to foraging and nesting marine turtles, with consequence severity dependent on the actual timing, duration and extent of a spill.
	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). 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, Sawfish and Rays Whale sharks and manta rays are known to frequent the Ningaloo Reef system and the Muiron Islands (forming feeding aggregations in late summer/autumn). Whale sharks and manta rays generally transit along the nearshore coastline 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 subsurface ram-feeding and active surface feeding (Taylor 2007). Passive feeding involves 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). Individuals that are present in worst affected spill areas would have the potential to ingest toxic amounts of entrained or dissolved aromatic

	hydrocarbons into their body. Large amounts of ingested hydrocarbons may affect endocrine and immune systems in the longer term. The presence of hydrocarbons may displace whale sharks from the area where they normally feed and rest, and potentially disrupt migration and aggregations to these areas in subsequent seasons. Whale sharks may also be affected indirectly by surface, entrained or dissolved aromatic hydrocarbons through the contamination of their prey. The preferred food of whale sharks are fish eggs and phytoplankton, 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 the spill event occurred during the spawning season, this important food supply (in worst 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 resident shark and ray (e.g. manta ray species identified in **Section 4.6.1**) populations to be impacted directly from hydrocarbon contact or indirectly through contaminated prey or loss of habitat. **Table 6-21** indicates the receptor locations predicted to be contacted by entrained hydrocarbons above the threshold concentration where impacts to the benthic communities of nearshore and subtidal communities could occur, potentially resulting in habitat loss. Therefore, the consequences to resident shark and ray populations (if present) from loss of habitat, may result in a disruption to a significant portion of the population; however, it is not expected to impact the overall viability of the population. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to inshore associated shark, sawfish and ray species, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions.
	Seabirds and/or Migratory Shorebirds In the event of a major spill, there is the potential for seabirds, and resident, non-breeding overwintering shorebirds that use the nearshore waters for foraging and resting, to be exposed to entrained, dissolved, and accumulated hydrocarbons. This could result in lethal or sublethal effects. Although breeding oceanic seabird species can travel long distances to forage in offshore waters, most breeding seabirds tend to forage in waters near their breeding colony. This results in relatively higher seabird densities in these areas during the breeding season, making these areas particularly sensitive in the event of a spill. Pathways of biological exposure that can result in impact may occur through ingesting contaminated fish (nearshore waters) or invertebrates (intertidal foraging grounds such as beaches, mudflats and reefs). Ingestion can also lead to internal injury to sensitive membranes and organs (IPIECA, 2004). Whether the toxicity of ingested hydrocarbons is lethal or sub-lethal will depend on the weathering stage and its inherent toxicity (note: the shortest entrained hydrocarbon time to contact with a shoreline is seven days (North Ningaloo Coast)). 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. Migratory shorebirds may be exposed to stranded hydrocarbon when foraging or resting in intertidal habitats, however, direct oiling is typically restricted to a relatively small portion of birds, and such oiling is typically restricted to the birds' feet. Modelling predicts that shoreline accumulation above impact thresholds are not expected at receptor groups; the potential for impacts to migratory shorebirds by accumulated hydrocarbons on shorelines is considered to be very low. Important areas for foraging seabirds and migratory shorebirds are identified in **Section 4.6.4.** Refer to **Table 6-21** for locations within the predicted extent of the EMBA that are identified as habitat for seabirds/migratory shorebirds. Suitable habitat or seabirds and shorebirds are broadly distributed along the mainland and nearshore island coasts within the EMBA. Of note are important nesting and resting areas, including (refer to **Section 4.6.4** for additional information, including BIAs within the wider EMBA): • Muiron Islands • Ningaloo Coast • Montebello/Barrow/Lowendal Islands Group (including known nesting habitats on Boodie, Double and Middle Islands) • Pilbara Islands South Island Group Therefore, a hydrocarbon spill may result in impacts on key feeding habitat and disruption to a significant portion of the habitat. 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, based on the assessment above and given the volatile and non-persistent nature of the hydrocarbons and low levels 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.
Summary of potential impacts to other species	
Setting	***Receptor Group***
All Settings	***Pelagic Fish Populations*** Fish mortalities are rarely observed to occur as a result of hydrocarbon spills (ITOPF 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 affected areas. Fish that have been exposed to dissolved aromatic hydrocarbons are capable of eliminating the toxicants once placed in clean water, so individuals exposed to a spill are likely to recover (King et al. 1996). Where fish mortalities have been recorded, 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, sublethal impacts to adult and juvenile fish may be possible, given long-term exposure (days to weeks) to polycyclic aromatic hydrocarbon (PAH) concentrations (Hjermann et al. 2007), which are typically the most toxic components of hydrocarbons. Light molecular weight aromatic hydrocarbons (i.e. one- and two-ring molecules) are generally soluble in water, which increases bioavailability to gill-breathing organisms such as fish. 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 help eliminate 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 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). Subtler, chronic effects on the life history of fish as a result of exposure in 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. Demersal species are associated with the Continental Slope Demersal Fish Communities KEF which overlaps the PAA. A number of additional KEFs that may host relatively diverse or abundant fish assemblages compared to relatively featureless continental shelf habitats occur within the wider EMBA (**Table 4-12**). KEFs within 200 km of the PAA include the: • Ancient Coastline at ~125 m depth contour (0.6 km east) provides complex substrate for increased biodiversity (DAWE, 2021). • Exmouth Plateau KEF (~87 km north-west), which is an important area of biodiversity (DAWE, 2021) • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF (140 km south-west), which has been shown to host demersal fish (BMT Oceanica 2016)

	• Commonwealth Waters adjacent to Ningaloo Reef KEF (~183 km south-west), which has high biological productivity and hosts a yearly aggregation of whale sharks (DAWE, 2021). • Glomar Shoals KEF (~162 km north-east), an area of high productivity, and species richness and abundance in shallow habitats (Abdul Wahab et al., 2018) Mortality and sublethal effects may impact populations located close to a well blowout and within the EMBA for entrained/dissolved aromatic hydrocarbons. Additionally, if prey (infauna and epifauna) surrounding the well location and within the EMBA is contaminated, this can result in the absorption of toxic components of the hydrocarbons (PAHs), potentially impacting fish populations that feed on these. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to pelagic fish species, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions.
Summary of Potential Impacts to Marine Primary Producers	
Setting	***Receptor Group***
Submerged Shoals	The waters overlying the submerged Rankin Bank and Glomar Shoals have the potential to be exposed to dissolved hydrocarbons above threshold concentrations (at or greater than 100 ppb and 50 ppb respectively). No entrained hydrocarbons above the threshold value are predicted to reach the Rowley Shoals, Rankin Bank, or Glomar Shoals, however may contact the submerged reefs and shoals of Barrow Island, the Montebello Shoals and southern Pilbara islands.. Entrained hydrocarbons reaching these shoals will be highly weathered, with the volatile and water soluble (often the most toxic) components expected to have dissipated (minimum time to contact with entrained hydrocarbons is predicted to be about 17 days to the Barrow Island reefs and Shoals, about 18 days for Montebello Shoals and 9 days to Pilbara banks and shoals). The permanently submerged habitats of Glomar Shoals and Rowley Shoals represent sensitive open water benthic community receptors, extending from deep depths to relatively shallow water. Given the depths of these habitats, it is likely the potential for biological impact is significantly reduced when compared to the upper water column layers. However, potential biological impacts could include sub-lethal stress and in some instances total or partial mortality of sensitive benthic organisms such as corals and the early life stages of resident fish and invertebrate species. The submerged shoals are areas associated with sporadic upwelling and associated primary productivity events. Impacts to plankton communities from exposure to entrained hydrocarbons above threshold concentrations may result in short-term changes in plankton community composition but recovery would occur. Hydrocarbon contact during the spawning seasons for resident shoal community benthos and fish (meroplankton), particularly exposure to in-water toxicity effects to biota, may result in the loss of a discrete cohort population but would not affect the longer term viability of resident populations. Therefore, any impacts to resident shoal community benthos and fish (meroplankton) are likely to be localised at the shoals and temporary. Hydrocarbon exposure to offshore filter-feeding communities may occur depending on the depth of the entrained/dissolved hydrocarbons. Exposure to entrained (aromatic) hydrocarbons (≥50 ppb) has potential to result in lethal or sub-lethal toxic effects. Sub-lethal impacts, including mucus production and polyp retraction, have been recorded for gorgonians exposed to hydrocarbon (White et al., 2012). Shoals that are exposed to entrained and/or dissolved hydrocarbons are expected to result in localised long-term effects, depending on the exposure concentrations and degree of weathering.
Mainland and Islands (Nearshore Waters)	***Coral Reef*** The quantitative spill risk assessment indicates there would be potential for coral reef habitat to be exposed to entrained hydrocarbons at locations including the Dampier Archipelago (including Legendre and Rosemary Island), Ningaloo Reef, Exmouth Gulf and Cape Range **Table 6-21**). Exposure to entrained hydrocarbons (≥100 ppb) has the potential to result in lethal or sublethal toxic effects to corals and other sensitive sessile benthos within the upper water column (top 20 m), including upper reef slopes (subtidal corals), reef flat (intertidal corals) and lagoonal (back reef) coral communities. Mortality in a number of coral species is possible, and this could result in the reduction of coral cover and change in the composition of coral communities. Sublethal 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 offshore

	islands (e.g. Barrow/Montebello/Lowendal Islands, Muiron Islands) and the mainland coast (i.e. Ningaloo Coast, Dampier Archipelago, Exmouth Gulf and Cape Range). With reference to Ningaloo Reef, wave-induced water circulation flushes the lagoon and may promote removal of entrained 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. These channels are across as much as ~15% of the length of Ningaloo Reef (Taylor and Pearce 1999). If a spill occurs 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 hydrocarbons, resulting in sublethal impacts and in some cases mortality—particularly 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 depend on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. Over the worst-affected sections of reef habitat, coral community live cover, structure and composition may reduce, manifested by loss of corals and associated sessile biota. Recovery of these impacted reef areas 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, with the supply of larvae from locations within Ningaloo Reef of critical importance to the healthy maintenance of the coral communities (Underwood 2009). 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). Therefore, a worst-case hydrocarbon spill scenario has the potential to result in large scale impacts to coral populations within the EMBA, with long-term effects (recovery >10 years) likely. The consequence severity is predicted to be greatest at reefs closest to the potential release location (e.g. Montebello Islands).
	Seagrass Beds/Macroalgae and Mangroves Spill modelling has predicted that entrained hydrocarbons above threshold concentrations have the potential to contact a number of nearshore locations that support biologically diverse, shallow subtidal and intertidal communities. The variety of habitat and community types, from the upper subtidal to the intertidal zones support a high diversity of marine life and are used as important foraging and nursery grounds by a range of invertebrate and vertebrate species. Depending on the trajectory of the entrained plume, macroalgal/seagrass communities including the Dampier Archipelago, Barrow Island, Lowendal Islands, Muiron Islands, Pilbara Islands, Montebello Islands as well as and Ningaloo Coast WHA's RUZ may have the potential to be exposed (see **Table 6-21** for a full list of receptors within the EMBA). Exposure to entrained hydrocarbons may result in mortality, depending on actual entrained exposure concentrations received and duration of exposure. Physical contact with entrained hydrocarbon droplets could cause sublethal stress, causing reduced growth rates and reduced tolerance to other stress factors (Zieman et al. 1984). Toxicity effects can also occur due to absorption of soluble fractions of hydrocarbons into tissues (Runcie et al. 2010). However, the potential for toxicity effects of entrained hydrocarbons may be reduced by weathering processes that should lower the content of soluble aromatic components before contact occurs. Mangrove habitat at Ningaloo Coast, Pilbara islands, and Montebello Islands may be contacted by entrained hydrocarbons within the EMBA (see **Table 6-21**). Entrained hydrocarbons may adhere to the sediment particles and 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 (NOAA 2014). Hydrocarbons may persist in the sediment, potentially causing chronic sublethal toxicity impacts beyond immediate physical and acute effects, which may delay recovery in an affected area. Recovery of mangroves from any impacts could be long-term (>10 years). Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to seagrass beds, macroalgae and mangrove communities within the EMBA, with

	consequence severity predicted to be greatest at receptors closest to the potential release location (e.g. Montebello Islands).
Summary of Potential Impacts to Other Habitats and Communities	
Setting	***Receptor Group***
Offshore	***Benthic Fauna Communities*** In the event of a major release at the seabed, the stochastic spill model predicted hydrocarbon droplets would be entrained, rapidly transporting them to the sea surface. As a result, the low sensitivity benthic communities associated with the unconsolidated, soft sediment habitat and any epifauna (filter feeders) associated with KEFs within the wider EMBA are not expected to have widespread exposure to released hydrocarbons (Ancient Coastline, Continental Slope Demersal Fish Communities KEF, Canyons KEF, Exmouth Plateau KEF and Commonwealth Waters adjacent to Ningaloo Reef KEF (**Section 4.7**)). Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to seabed and associated epifauna and infauna within the EMBA, with impacts predicted to be greatest for habitats closest to the potential release location.
	Open Water – Productivity/Upwelling Primary production by plankton (triggered by sporadic upwelling events in the offshore waters) is an important component of the primary marine food web. Planktonic communities are generally mixed, including phytoplankton (cyanobacteria and other microalgae), secondary consuming zooplankton (e.g. copepods), and the eggs and larvae of fish and invertebrates (meroplankton). 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 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 surface, 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 (ITOPF 2011a). Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to plankton populations within the EMBA, with impacts predicted to be greatest for habitats closest to the potential release location
	Filter Feeders Entrained hydrocarbons above the 100 ppb ecological thresholds will be limited to the top 20 m of the water column beyond the immediate source. Entrained hydrocarbons are therefore not expected to impact filter feeder habitats in deep offshore waters including filter feed communities associated with the Ancient Coastline KEF, Continental Slope Demersal Fish Communities KEF, Canyons KEF, Exmouth Plateau KEF and Commonwealth Waters adjacent to Ningaloo Reef KEF. Refer to 'mainland and islands (nearshore waters) for a description of potential impacts to filter feeders in shallower waters.
	Open Water – Physical Displacement of Fauna from Gas Plume The effect of the physical extent of the gas plume in the environment is expected to have a limited and localised effect on identified receptors such as the physical barrier created by the gas plume, which may displace transient and/or mobile biota such as pelagic fish, megafauna species (migratory whales) and plankton. It is acknowledged that the physical extent of the plume may displace some open water species transiting the offshore waters of this area of the NWS. The extent of the plume is relatively small in comparison to the surrounding offshore environment but the overall impact to the in-water biota and the marine environment in general is expected to be slight to minor short-term impact to communities in the EMBA.
Mainland and Islands (Nearshore Waters)	***Open Water – Productivity/Upwelling*** Nearshore waters and adjacent offshore waters surrounding the offshore islands (e.g. Montebello/ Barrow/Lowendal Islands Group, Muiron Islands, Pilbara Islands), the Dampier Archipelago and to the west of the Ningaloo Reef system are known locations of seasonal upwelling events and productivity. The seasonal productivity events are critical to krill production, which supports megafauna

	aggregations such as whale sharks and manta rays in the region. This has the potential to result in lethal and sublethal impacts to a certain portion of plankton in affected areas, depending on concentration and duration of exposure and the inherent toxicity of the hydrocarbon. However, recovery would occur (see Offshore description above). Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to plankton populations within the EMBA.
	Spawning/Nursery Areas Fish (and other commercially targeted taxa) in their early life stages (eggs, larvae and juveniles) are at their most vulnerable to lethal and sublethal impacts from exposure to hydrocarbons, particularly if a spill coincides with spawning seasons or reaches nursery areas close to the shore (e.g. seagrass and mangroves) (ITOPF 2011a). Fish spawning (including for commercially targeted species such as snapper and mackerel) occurs in nearshore waters at certain times of the year, and nearshore waters are also inhabited by higher numbers of juvenile fishes than offshore waters. Modelling indicated that, in the event of a major spill, there is potential for entrained hydrocarbons to occur in the surface water layers above threshold concentrations in nearshore waters, including Montebello/Barrow/Lowendal Islands Group, Pilbara Southern Islands Groups, Ningaloo Coast, Exmouth Gulf West, and the Muiron Islands. This has the potential to result in lethal and sublethal impacts to a portion of fish larvae in areas contaminated above impact thresholds, depending on concentration and duration of exposure and the inherent toxicity of the hydrocarbon. Although there is the potential for spawning/nursery habitat to be impacted (e.g. mangroves and seagrass beds, discussed above), losses of fish larvae in worst-affected areas are unlikely to be of major consequence to fish stocks compared with significantly larger losses through natural predation, and the likelihood that most nearshore areas would be exposed is low (i.e. not all areas in the region would be affected). This is supported by a study in the Gulf of Mexico, which used juvenile abundance data from shallow-water seagrass meadows as indices of the acute, population-level responses of young fishes to the Deepwater Horizon spill. Results indicated that there was no change to the juvenile cohorts following the Deepwater Horizon spill. Additionally, there were no significant post-spill shifts in community composition and structure, nor were there changes in biodiversity measures (Fodrie and Heck 2011). Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to spawning fish and/or nursery areas within the EMBA, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to key spawning periods and locations.
	Non-biogenic Reefs The reef communities fringing the Pilbara region (e.g. Pilbara islands) may be exposed to entrained hydrocarbons (at or above the threshold concentration), and consequently exhibit lethal or sublethal impacts resulting in partial or total mortality of keystone sessile benthos, particularly hard corals; thus, potential community structural changes to these shallow, nearshore benthic communities may occur. If these reefs are exposed to entrained hydrocarbons, impacts are expected to result in localised long-term effects. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to non-biogenic reefs within the EMBA.
	Filter Feeders Hydrocarbon exposure to shallow nearshore filter feeding communities (< 20 m) (e.g. Montebello Islands, Dampier Archipelago) may occur. Exposure to entrained aromatic hydrocarbons has the potential to result in lethal or sublethal toxic effects. Sublethal impacts, including mucus production and polyp retraction, have been recorded for gorgonians exposed to hydrocarbon (White et al. 2012). Any impacts may result in localised long-term effects to community structure and habitat. Nearshore filter feeders that are present in shallower water (< 20 m) may potentially be impacted by entrained hydrocarbon through lethal/sublethal effects, although given the distance from source hydrocarbons are expected to be less toxic due to the weathering process. Such impacts may result in localised, long term effects to community structure and habitat. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to filter feeders within the EMBA.
	Sandy Shores/Estuaries/Tributaries/Creeks (including Mudflats)/Rocky Shores

	Shoreline exposure for the upper and lower areas differ. The upper shore has the potential to be exposed to surface slicks, while the lower shore is potentially exposed to entrained hydrocarbon. Potential impacts may occur due to hydrocarbon contact with intertidal areas, including sandy shores, mudflats and rocky shores, listed in **Table 6-25**. Hydrocarbon at sandy shores is incorporated into fine sediments through mixing in the surface layers from wave energy, penetration down worm burrows and root pores. Hydrocarbon in the intertidal zone can adhere to sand particles; however, high tide may remove some or most of the hydrocarbon back of the sediments. Typically, hydrocarbon is only incorporated into the surface layers to a maximum of ~10 cm. As described earlier, accumulated hydrocarbons ≥100 g/m² could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat (French-McCay, 2009). Note that no shoreline accumulation above impact thresholds was identified by the stochastic modelling and long term impacts to shorelines is not expected.
Key Ecological Features	***Key Ecological Features*** KEFs potentially impacted by the hydrocarbon spill from a loss of well containment event are detailed in **Section 4.7**. Although these KEFs are primarily defined by seabed geomorphological features, they can indicate a potential for increased biological productivity and, therefore, ecological significance. The consequences of a hydrocarbon spill from a loss of well containment event are predicted to result in minor impacts to values of the KEFs affected (for the values of each KEF, see **Section 4.7**). Impacts to benthic habitats are not predicted given the maximum depth of entrained hydrocarbons above 100 ppb is predicted to be 20 m beyond the immediate source. Potential impacts to associated pelagic communities may occur as described above and below. The KEFs within the EMBA have relatively broad-scale distributions and are unlikely to be significantly impacted. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to the ecological values of KEFs within the EMBA, with impacts predicted to be greatest for habitats closest to the potential release location.
Summary of Potential Impacts to Water Quality	
Setting	***Receptor Group***
All Settings	***Open Water – Water Quality*** The highly-mixed, open water location will result in rapid evaporation and dispersion. Water quality would be reduced and is predicted to be at or above biological effect concentrations for the surrounding marine waters over the Montebello Marine Park. The submerged Tryal Rocks (30-40 m depth) within the Montebello Marine Park has the potential to be exposed to entrained hydrocarbons at or greater than 100 ppb. The waters surrounding this submerged habitat would show a reduction in quality due to hydrocarbon contamination above background and/or national/international quality standards. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to water quality within the EMBA, with impacts predicted to be greatest for areas closest to the release location.
Summary of Potential Impacts to Marine Sediment Quality	
Setting	***Receptor Group***
Offshore	***Marine Sediment Quality*** Studies of hydrocarbon concentrations in deep-sea sediments in the vicinity of a catastrophic well blowout indicated hydrocarbon from the blowouts can be incorporated into 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 hydrocarbon would form droplets that would be transported into the water column to the surface (i.e. transported away from the seabed). As a result, the extent of potential impacts to the seabed area at and surrounding the release site would be largely 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, as hydrocarbons in sediments typically undergo slower weathering and degradation (Diercks et al. 2010, Liu et al. 2012). There is the potential for floating and entrained hydrocarbons to sink following extensive weathering and adsorption of sediment particles, which may result in the deposition of hydrocarbons to the seabed in

	areas distant from the release location. Such hydrocarbons are expected to be less toxic due to the weathering process. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in slight, short-term impacts to offshore sediment quality within a localised area of the PAA.
Mainland and Islands (Nearshore Waters)	***Marine Sediment Quality*** Entrained and dissolved hydrocarbons (at or above the defined threshold) are predicted to potentially contact shallow, nearshore waters of identified islands and mainland coastlines. Hydrocarbons may occur (at or above the ecological impact thresholds) at the Montebello Islands, islands along the Pilbara coast and near Exmouth Gulf and the Ningaloo Coast (refer to **Table 6-21**). Such hydrocarbon contact may lead to reduced marine sediment quality through adherence to sediment. However, given the nature of the hydrocarbon and degree of weathering that is expected prior to contact with nearshore seabed habitats, contamination of sediments is expected to be limited and short term. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to sediment quality within the EMBA, with impacts predicted to be greatest for areas closest to the potential release location.

Summary of Potential Impacts to Air Quality

A hydrocarbon release during a loss of well containment has the potential to result in short-term reduction in air quality. There is potential for human health effects on workers in the immediate vicinity of atmospheric emissions. The ambient concentrations of VOCs released from diffuse sources is difficult to accurately quantify, although their behaviour and fate is predictable in open offshore environments, as VOC emissions disperse rapidly by meteorological factors such as wind and temperature. VOC emissions from a hydrocarbon release in such environments are rapidly degraded in the atmosphere by reaction with photochemically produced hydroxyl radicals.

Given the remote likelihood of occurrence of a loss of well containment, the temporary nature of any VOC emissions (from either gas surfacing or weathering of liquid hydrocarbons from a loss of well containment), the predicted behaviour and fate of VOCs in open offshore environments, and the significant distance from the PAA to the nearest sensitive airshed (town of Dampier ~180 km away), a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to air quality within the EMBA, with impacts predicted to be greatest for areas closest to the potential release location.

Summary of Potential Impacts to Protected Areas

The quantitative spill risk assessment results indicate that the open-water environment protected within a number of Commonwealth AMPs, State Marine Parks, World Heritage Areas and other protected places (refer to **Table 6-21**)**.** may be affected by released hydrocarbons in the event of a loss of well containment. In the unlikely event of a major spill, entrained hydrocarbons and/or dissolved hydrocarbons may contact the identified key receptor locations of islands and mainland coastlines, resulting in the actual or perceived contamination of the protected areas, identified in **Table 6-21**.

The Montebello AMP has the greatest potential to be contacted by surface hydrocarbons, dissolved aromatic hydrocarbons and entrained hydrocarbons at or above the defined ecological effect concentrations. Hydrocarbons at or exceeding impact thresholds also have the potential to contact other protected areas, including the Argo-Rowley Terrace AMP, Carnarvon Canyon AMP, Gascoyne AMP, Ningaloo AMP and WHA, Shark Bay AMP, Ashmore Reef AMP and Abrolhos AMP. In most cases, the hydrocarbons that are predicted to reach these protected areas will be in an advanced state of weathering and at concentrations typically associated with lethal and sub-lethal impacts to only the most sensitive marine organisms. The potential (albeit low probability) of visible surface hydrocarbons exceeding 1 g/m^2 reaching these protected areas may result in a perception from stakeholders and the public of more significant impacts than actually occur.

Objectives in the management plans for protected areas within the EMBA, including AMPs require consideration of a number of physical, ecological, socio-economic and heritage values identified in these areas (**Section 4.8**). Impact on the values of these protected areas are discussed in the relevant sections above for ecological and physical values and below for socio-economic and heritage values.

Additionally, such hydrocarbon contact may alter stakeholder understanding and/or perception of the protected marine environment, given these represent areas largely unaffected by anthropogenic influences and contain biological diverse environments.

Summary of Potential Impacts to Socioeconomic Values

Setting	***Receptor Group***
Offshore	***Fisheries – Commercial*** A hydrocarbon release during a loss of well containment event has the potential to result in direct impacts to target species of Commonwealth and State fisheries within the defined EMBA (refer

	Section 4.9.3). Lethal and sublethal effects may impact localised populations of targeted species within the EMBA for entrained/dissolved hydrocarbons. However, entrained hydrocarbons are likely to be confined in the upper water column; therefore, demersal species are less likely to be exposed to hydrocarbons than pelagic species. A major loss of hydrocarbons from the Petroleum Activities Program may also lead to an exclusion of fishing from the spill-affected area for an extended period. 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 its efficacy depends on the magnitude of the hydrocarbon contamination. Fish have a high capacity to metabolise these hydrocarbons, while crustaceans (such as prawns) have a reduced ability (Yender et al. 2002). Seafood safety is a major concern associated with spill incidents. Therefore, actual or potential seafood contamination can affect commercial and recreational fishing and can impact seafood markets long after any actual risk to seafood from a spill has subsided (Yender et al. 2002). A major spill would result in the establishment of an exclusion zone around the spill-affected area. There would be a temporary prohibition on fishing activities for a period of time, and subsequent potential for minor economic impacts to affected commercial fishing operators. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major, long-term impacts to commercial fisheries within the EMBA, particularly for pelagic fisheries and fisheries with most of their effort focused within the EMBA. Potential impacts to inshore fisheries are discussed in the Mainland and Islands (nearshore) impacts discussion below, and the impact assessment relating to spawning is discussed above.
	Tourism including Recreational Activities Recreational fishers predominantly target large 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 peak activity between April and October (Smallwood et al. 2011) for the Exmouth region. Limited recreational fishing takes place in the offshore waters of the PAA. Impacts on species that are recreationally fished are described above under Summary of Potential Impacts to Other Species. A major loss of hydrocarbons from the Petroleum Activities Program may lead to exclusion of marine nature-based tourist activities, resulting in a loss of revenue for operators. Tourism is a major industry for the region and visitor numbers would likely reduce if a hydrocarbon spill were to occur, based on the perception of hydrocarbon spills and associated impacts. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in moderate, medium term impacts to tourism and recreation within the EMBA.
	Offshore Oil and Gas Infrastructure A hydrocarbon release during a loss of well containment event has the potential to result in disruptions to production at existing petroleum facilities (platforms and FPSOs), as well as activities such as drilling and seismic exploration. For example, facility water intakes for cooling and fire hydrants could be shut off if contacted by floating hydrocarbons, which could in turn lead to the temporary cessation of production activities. Spill exclusion zones established to manage the spill could also prohibit access for activity support vessels as well as offtake tankers approaching facilities off the North West Cape. The impact on ongoing operations of regional production facilities would be determined by the nature and scale of the spill and metocean conditions. 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 production facilities are: • Pluto platform (operated by Woodside Burrup Pty Ltd): ~30 km north-west from the PAA • Wheatstone platform (operated by Chevron): ~33 km north-east from the PAA • John Brookes (operated by Santos WA Southwest P/L): ~27 km south from the PAA • East Spar (operated by Quadrant Energy): ~55 km south from the PAA • Goodwyn Alpha platform (operated by Woodside Energy Ltd): ~88 km north-east of the PAA Operation of these facilities is likely to be affected in the event of a well blowout spill. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in slight, short-term impacts to oil and gas industry within the EMBA.
Submerged Shoals	***Tourism and Recreation***

	A hydrocarbon release during a loss of well containment event has the potential to result in a temporary prohibition on charter boat recreational fishing/diving and any other marine nature-based tourism trips to Rankin Bank and Rowley Shoals. Therefore, a worst-case hydrocarbon spill scenario has the potential to result in minor, short-term impacts to tourism and recreational activities within the EMBA.
Mainland and Islands	***Fisheries – Commercial*** Nearshore Fisheries and Aquaculture In the unlikely event of a loss of well integrity, there is the possibility that target species in some areas used by a number of State fisheries, prawn fisheries, pearl oyster fisheries and aquarium fisheries in nearshore waters of the mainland coast and islands that are within the EMBA could be affected. Targeted fish, prawn, mollusc and lobster species could experience sub-lethal stress, or in some instances mortality, depending on the concentration and duration of hydrocarbon exposure and its inherent toxicity. The hydrocarbons predicted to reach these nearshore water locations will be in an advanced state of weathering and at concentrations typically associated with lethal and sub-lethal impacts to only the most sensitive marine organisms. Therefore, direct impacts may be limited to sub-lethal impacts only. However, there is also the potential for tainting of target species and for negative public perception. Prawn Managed Fisheries In a major spill, the modelling indicated the entrained EMBA may extend to nearshore waters closest to the mainland Pilbara and Gascoyne coasts, including the actively fished areas of the designated Onslow Prawn Managed Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery and the Shark Bay Prawn and Scallop Managed Fishery, and managed prawn nursery areas. Note that the majority of the demarcated area for the prawn managed fishery in the Exmouth Gulf (proper) is outside the EMBA. Those fisheries that occur within the EMBA occur in shallow, nearshore waters where limited hydrocarbon exposures are predicted to occur. Prawn habitat utilisation differs between species in the post-larval, juvenile and adult stages (Dall et al., 1990). Direct impacts to benthic habitat due to a major spill has the potential to impact prawn stocks. For example, juvenile banana prawns are found almost exclusively in mangrove-lined creeks (Rönnbäck et al., 2002), whereas juvenile tiger prawns are most abundant in areas of seagrass (Masel and Smallwood, 2000). Adult prawns also inhabit coastline areas but tend to move to deeper waters to spawn. In a major spill, the model predicted shallow subtidal and intertidal habitats at the Muiron Islands, Montebello Islands, Barrow Island, Lowendal Islands, Pilbara Southern Islands Group, Exmouth Gulf, and mangrove and seagrass habitats of the Ningaloo Coast are located within the EMBA and could be exposed to hydrocarbon concentrations above threshold concentrations, depending on the trajectory of the plume. Localised loss of juvenile prawns in worse spill affected areas is possible. Whether lethal or sub-lethal effects occur will depend on duration of exposure, hydrocarbon concentration, weathering stage of the hydrocarbon and its inherent toxicity. Furthermore, seafood consumption safety concerns and a temporary prohibition on fishing activities may lead to subsequent potential for economic impacts to affected commercial fishing operators.
	Tourism and Recreation In the event of a major spill, the nearshore waters of offshore islands and reefs (e.g. Barrow/Montebello/Lowendal Islands Group, Muiron Islands, Pilbara Islands, Dampier Archipelago etc.) as well as the Ningaloo coast could be reached by entrained and dissolved hydrocarbons depending on prevailing wind and current conditions. There is also a low probability of shoreline accumulation above the socio-cultural threshold (but not the ecological threshold) at a number of receptor sites. As these locations offer a number of amenities such as fishing, swimming and using beaches and surrounds, they have a recreational value for local residents and visitors. If a potental well blowout event resulted in hydrocarbon contact, there could be restricted access to beaches for a period of days to weeks, until natural weathering, tides, currents or oil spill response (e.g. shoreline clean-up if safe to do so) removes the hydrocarbons. In the event of a well blowout, tourists and recreational users may also avoid areas due to perceived impacts, including after the oil spill has dispersed. There is the potential for stakeholder perception that this environment will be contaminated over a large 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 perceptions regarding the spill (Oxford Economics 2010). Therefore, a worst-case hydrocarbon spill scenario has the potential to result in moderate, medium-term impacts to tourism and recreational activities within the EMBA.
	Cultural Heritage There are a number of historic shipwrecks identified within 50km of the PAA (**Table 4-20).** The closest known wrecks are those of the Curlew (11 km north-east), Marietta (11 km north-east), Vianen (11 km north-east), Wild Wave (China) (11 km north-east), Tanami (32 km south east) and Trial (33 km south-east). 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). Entrained hydrocarbons above the threshold concentration are predicted at the Montebello/ Barrow/ Lowendal islands. There is also a low probability of shoreline accumulation above the socio-cultural threshold (but not the ecological threshold). However, artefacts, scatter and rock shelters are on land above the high water mark on Barrow and Montebello islands; therefore, no contact is predicted for these areas. Within the wider EMBA are several designated heritage places (**Section 4.9.1**). These places are also covered by other designations such as World Heritage Area. 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, the EMBA includes the areas listed in **Table 6-21**. This incorporates AMPs as well as other sensitive marine environments and associated receptors of the Muiron Islands, Ningaloo Coast, Exmouth Gulf, Rankin Bank, Glomar Shoals, Rowley Shoals, Montebello/Barrow/Lowendal Islands Group, the Pilbara Southern and Northern Islands Group, Shark Bay, and the Abrolhos Islands. 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. In summary, long term- impacts may occur at sensitive nearshore and shoreline habitats, particularly areas of the Barrow and Montebello Islands, as a result of a major spill of hydrocarbon from well intervention activities within the PAA. The overall environmental consequence is defined as 'B – Major, long term impact (ten 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)**9F[31]	**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	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	Benefits outweigh cost/sacrifice	Yes **C 11.1**

[31] Qualitative measure

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**9F[31]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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 verified (physical evidence of the correct placement and performance) during the permanent plugging of the well (if required).		blowout would not be reduced, the reduction in likelihood reduces the overall risk.		
In the event of a spill, emergency response activities implemented in accordance with the OPEP (per **Table 7-4**).	F: Yes. CS: Costs associated with implementing response strategies,	This control would not reduce the likelihood, but response activities may reduce the consequence.	Benefits outweigh cost/sacrifice.	**Yes** **C 11.2**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**9F[31]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	vary dependant on nature and scale of spill event. Standard practice.			
Arrangements supporting the activities in the OPEP (per **Table 7-4**) 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 11.3**
As-built checks that shall be completed during well operations to establish a minimum acceptable standard of well integrity.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of occurrence. No reduction in consequence will occur.	Benefits outweigh cost/sacrifice.	**Yes** **C 2.3**
An approved Source Control Emergency Response Plan (SCERP) shall exist prior to drilling, 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 11.4**
Implement requirements for permanent plugging and abandonment: • Adherence to an accepted WOMP • 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.	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 11.5**
Good Practice				
Subsea BOP installed, and function tested during permanent plugging operations. The BOP shall meet the Woodside Well Control Procedure, Woodside Engineering Standard – Rig Equipment and shall be subject to API Standard 53 BOP Risk Assessment.	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 11.6**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**9F[31]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Project specific Mooring Design-Analysis.	F: Yes. CS: Standard practice. Required by Woodside standards.	Ensure adequate MODU station holding capacity to prevent loss of station keeping. This will reduce the likelihood of a blowout resulting in release of hydrocarbons to the marine environment.	Benefits outweigh cost/sacrifice.	**Yes** **C 7.4**
Professional Judgement – Eliminate				
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
No additional controls identified.				
Risk Based Analysis				
A quantitative spill risk assessment was performed (refer **Section 6.8.1**)				
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**. Consultation was conducted for this program to identify the views and concerns of relevant stakeholders, 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 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 2.7**, Woodside considers the current risk ratings for a Decision Type B to be acceptable, if ALARP is demonstrated using good industry practice, consideration of company and societal values and 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. ***Principles of ESD*** The impact and risk evaluation has taken into account the following relevant principles of ESD: decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations				

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**9F[31]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**

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 Petroleum Activities Program 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 Health and Safety and Environment and Biodiversity Policies (Appendix A)
- Woodside Risk Management Policy (Appendix A)
- Engineering Standards – Well Barriers
- Well Acceptance Criteria Procedure
- Drilling and Completions – 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. Stakeholder consultation, outlined below, has been performed prior to the Petroleum Activities Program.

External Context

During stakeholder consultation with relevant persons, DoT requested to be consulted on spill risks with a potential to impact State Waters (**Table 5-4**). 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 were raised during stakeholder engagement.

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 is in place. Woodside develops an activity SCERP, including the Relief Well Plan, which is signed off by the Drilling Engineering Manager and maintains a list of rigs that are currently operating in Australia (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 7.8. 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.

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 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

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**9F[31]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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 - 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 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 stakeholder 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 2.7.2**, this is considered an acceptable level of risk.				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 11 No loss of well integrity resulting in loss of hydrocarbons to the marine environment during the Petroleum Activities Program	**C 11.1** 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 during well construction and abandonment	**PS 11.1** Wells drilled in compliance with the accepted WOMP, including implementation of barriers to prevent a loss of well integrity.	**MC 11.1.1** Acceptance letter from NOPSEMA demonstrates the WOMP and application to drill were accepted by NOPSEMA prior to the drilling and plug and abandonment activities commencing. **MC 11.1.2** Records demonstrate minimum of two verified barriers (a single fluid barrier may be implemented during the initial stages of well construction if appropriateness is confirmed by a shallow hazard study) were in place for all permeable zones penetrated by the wellbore. **MC 11.1.3** Records demonstrate composition and weight of drilling fluids were applicable to down hole conditions.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	• (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 11.2 In the event of a spill emergency response activities implemented in accordance with the OPEP (per **Table 7-4**).	**PS 11.2** In the event of a spill the OPEP (per **Table 7-4**) requirements are implemented	**MC 11.2.1** Completed incident documentation
	C 11.3 Arrangements supporting the activities in the OPEP (per **Table 7-4**) will be tested to ensure the OPEP can be implemented as planned.	**PS 11.3.1** Exercises/tests will be conducted in alignment with the frequency identified in **Table 7-10.**	**MC 11.3.1** Testing of arrangement records confirm that emergency response capability has been maintained
		PS 11.3.2 Woodside's procedure demonstrates a minimum level of trained personnel, for core roles in the OPEP (per **Table 7-4**), are maintained	**MC 11.3.2** Emergency Management dashboard confirms that minimum level of personnel trained for core OPEP roles are available.
	C 11.4 As-built checks shall be completed during well operations to establish a minimum acceptable standard of well integrity.	**PS 11.4** Achieve a minimum acceptable standard of well integrity.	**MC 11.4.1** Records show Well Acceptance criteria are developed for each well.
	C 11.5 An approved SCERP shall exist prior to drilling, including feasibility and any specific considerations for relief well kill.	**PS 11.6** SCERP is in place to ensure feasibility of responding to a source control incident.	**MC 11.6.1** An approved Source Control Emergency Response Plan.
	C 11.6 Implement requirements for permanent well abandonment if required: • Adherence to an accepted WOMP	**PS 11.7** Woodside abandons the wells according to internal Woodside Procedure.	**MC 11.7.1** Records demonstrate well acceptance criteria have been met.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	• well barrier as per the internal Woodside Standard and Procedure • placement, length, material and verification of a permanent barrier.		
	C 11.7 Subsea BOP installed, and function tested during permanent plugging operations. The BOP shall meet the Woodside Well Control Procedure, Woodside Engineering Standard – Rig Equipment and shall be subject to API Standard 53 BOP Risk Assessment.	**PS 11.8** 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 11.8.1** Records demonstrate that BOP and BOP control system specifications and function testing were in accordance with minimum standards for the expected permanent plugging conditions as agreed by Woodside and MODU contractor
	C 7.4 **Refer Section 6.7.6**	**PS 7.4** **Refer Section 6.7.6**	**MC 7.4** **Refer Section 6.7.6**
	For oil spill response outcomes, standards and measurement criteria refer to **Appendix D**.		

6.8.3 Unplanned Hydrocarbon Release: Vessel Collision

Context		
Relevant Activities Project Vessels and Support Activities – **Section 3.9**	**Existing Environment** Physical Environment – **Section 4.4** Habitats and Biological Communities – **Section 4.5** Protected Species – **Section 4.6** Socio-economic Environment – **Section 4.9**	**Stakeholder Consultation** 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***
Loss of hydrocarbons to marine environment due to a vessel collision (e.g. project vessels or other marine users)		X		X	X	X	A	D	1	M	LCS GP PJ	Broadly Acceptable	EPO 12

Description of Source of Impact

Background

The temporary presence of the MODU and project vessels in the PAA might result in a navigational hazard for commercial shipping within the immediate area (as discussed in **Section 6.7.4**). 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.

The optional decommissioning vessel may have a single tank fuel capacity of 500 – 1000 m^3. A refuelling vessel may also have a single fuel tank capacity of 2000 m^3.

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 – 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 the Petroleum Activities Program, 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.

Industry Experience

Registered vessels or foreign flag vessels in Australian waters are required to report events to the Australian Transport Safety Bureau (ATSB), AMSA or Australian Search and Rescue (AusSAR).

From a review of the ATSB marine safety and investigation reports, one vessel collision occurred in 2011/12 that resulted in a spill of 25–30 L of 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**). The scenarios considered damage to single and multiple fuel storage tanks in a project vessel and MODU due to dropped objects and various combinations of vessel to vessel and vessel to MODU collisions. 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 not a credible scenario that a collision between the support vessel and MODU would damage any storage tanks, due to the location of the tanks on both vessel types and secondary containment.
- 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 the **Table 6.**

Given the offshore location of the PAA, vessel grounding is not considered a credible risk.

Table 6-26: Summary of credible hydrocarbon spill scenario as a result of vessel collision

Scenario	Hydrocarbon Volumes	Preventative and Mitigation Controls	Credibility
Breach of MODU fuel tanks due to vessel collision.	MODU has a fuel oil storage capacity of about 966 to 1400 m³ distributed through multiple tanks.	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	Activity support vessel has multiple marine diesel tanks	Typically, double wall tanks that are located mid ship (not bow or stern).	**Not credible** Collision with MODU at slow speeds is highly unlikely and,

due to collision with MODU.	typically ranging between 22 to 105 m³ each.	Slow support vessel speeds when in proximity to MODU.	if it did occur, is highly unlikely to result in a breach of support vessel (low energy contact from slow moving vessel).
Breach of support vessel fuel tanks due to support vessel – other vessel collision including commercial, shipping/fisheries.	Activity support vessel has multiple marine diesel tanks typically ranging between 22–105 m³ each.	Typically, double wall, tanks which are located midship (not bow or stern). Vessels are not anchored and steam at low speeds when relocating within the Operational Area 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 decommissioning vessel fuel tanks due to collision with another vessel including commercial shipping/fisheries.	Decommissioning vessel have multiple isolated tanks, largest volume of a single tank is unlikely to exceed 500 to 1000 m³	Tank locations midship (not bow or stern). decommissioning vessel will be holding station during decommissioning activities or steaming at low speeds when relocating within the Operational Area.	**Credible** Decommissioning vessel – third party vessel collision could potentially result in the release from a fuel tank.
Breach of the largest single tank inventory of a fuel tanker due to collision with a decommissioning vessel.	A fuel tanker will have a maximum single inventory tank of 2000 m³.	Refer to Section 6.7.4 for preventative and mitigation controls.	**Credible** Decommissioning vessel – fuel tanker collision could potentially result in the release from a fuel tank. It is noted that this scenario is only credible if refuelling of a decommissioning vessel is required in the field.
Breach of AHV fuel tanks due to collision with third-party vessel, including commercial shipping and fishing.	Largest volume of a single tank is likely to be <264 m³.	Tank locations midship (not bow or stern).	**Credible** AHV – third-party vessel collision could potentially result in the release from a fuel tank.
Breach of survey vessel fuel tanks due to collision with third-party vessel, including commercial shipping and fishing.	Largest volume of a single tank is likely to be <275 m³.	Tank locations midship (not bow or stern).	**Credible** Survey 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 at a nearby location <5 km from the proposed Julimar South-1 well. The modelling assessed the extent of a marine diesel spill volume of 2000 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 an analogous 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 about 45% by mass would be expected to evaporate over the first 24 hours

(**Figure 6-3**) (RPS, 2019). 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 6-22**.

Table 6-22: Characteristics of the marine diesel

Hydrocarbon type	Initial density (g/cm³) at 25 °C	Viscosity (cP @ 25 °C)	Component BP (°C)	Volatiles %<180	Semi volatiles % 180–265	Low volatility (%) 265-380	Residual (%) >380
				Non-Persistent			Persistent
Marine diesel	0.829	4.0	% of total	6	34.6	54.4	5

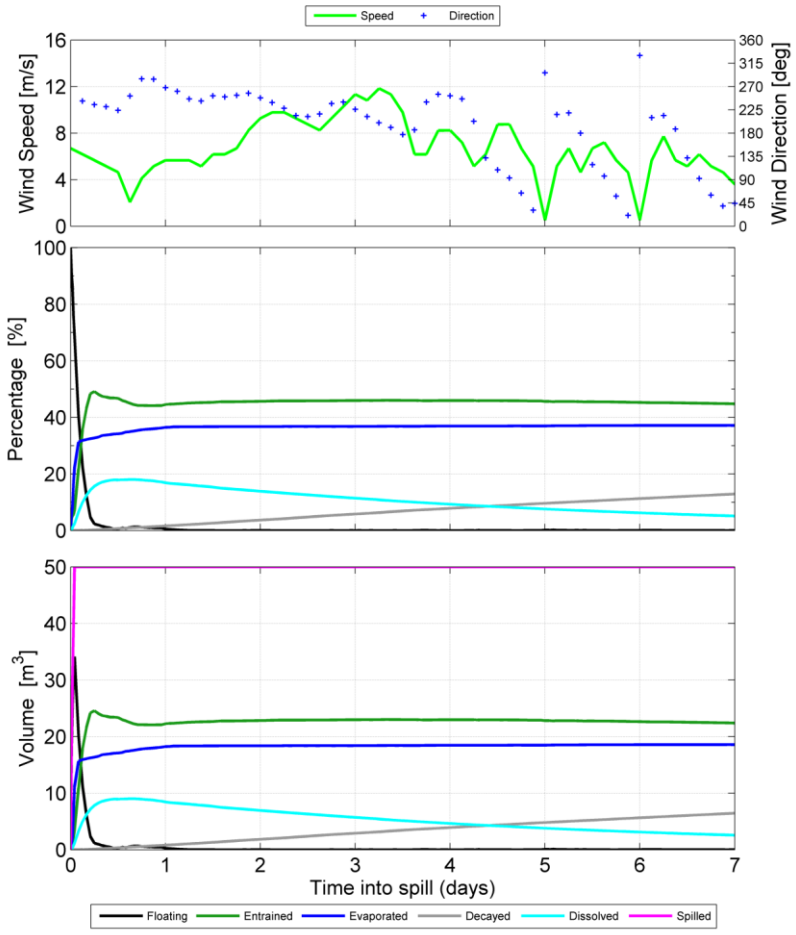


Figure 6-3: Proportional mass balance plot representing weathering of a 2000 m³ surface spill of marine diesel as a one-off release (at a rate of 50 m³/hr) and subject to variable wind at 27 °C water temperature and 25 °C air temperature (RPS, 2019)

Impact Assessment

Potential Impacts Overview

Environment that May Be Affected

Surface Hydrocarbons

Quantitative hydrocarbon spill modelling results for surface hydrocarbons are shown in . 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 88 km from the release location at or above the 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 ecologocial impacts may occur.

Entrained Hydrocarbons

Quantitative hydrocarbon spill modelling results are shown in **Table 6-23**. 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. **Table 6-23** provides details of receptors potentially contacted by entrained diesel at 100 ppb.

Dissolved Hydrocarbons: Dissolved aromatic hydrocarbons at concentrations equal to or greater than the 50 ppb threshold are predicted to be confined to open water. No contact with sensitive receptor locations is predicted.

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 a maximum accumulated volume of <1 m^3 and a maximum local accumulated concentration of 21 g/m^2 forecast at the Pilbara Islands – Southern Island Group receptor.

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 6.8.2.**

Table 6-23: Probability of hydrocarbon spill contact above impact thresholds within the EMBA 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																					Socioeconomic and Cultural					Socio-cultural EMBA		Ecological EMBA			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*				*Other Communities / Habitats*						*Protected Species*									*Other Species*												
		Open water – (pristine)	*Marine Sediment – (pristine)*	*Coral reef*	*Seagrass beds / Macroalgae*	*Mangroves*	*Spawning/nursery areas*	*Open water – Productivity/upwelling*	*Non-biogenic reefs*	*Offshore filter feeders and/or deepwater benthic communities*	*Nearshore filter feeders*	*Sandy shores*	*Estuaries / tributaries / creeks / lagoons (including mudflats)*	*Rocky shores*	*Cetaceans – migratory whales*	*Cetaceans – dolphins and porpoises*	*Dugongs*	*Pinnipeds (sea lions and fur seals)*	*Marine turtles (foraging and internesting areas and significant nesting beaches)*	*Sea snakes*	*Whale sharks*	*Sharks and rays*	*Seabirds and/or migratory shorebirds*	*Pelagic fish populations*	*Resident /Demersal Fish*	*Fisheries – commercial*	*Fisheries – traditional*	*Tourism and Recreation*	*Protected Areas / Heritage – European and Indigenous / Underwater Cultural Heritage*	*Offshore Oil and Gas Infrastructure (topside and subsea)*	Surface hydrocarbon (1-10 g/m²)	Accumulated hydrocarbons (10–100 g/m²)	Surface hydrocarbon (≥10 g/m²)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m²)
Offshore[32]	Argo-Rowley Terrace AMP	✓						✓							✓	✓			✓			✓	✓	✓		✓			✓		-	-	-	1.5	-	-
	Montebello AMP	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		2.5	-	2	13	3	-
	Gascoyne AMP	✓	✓												✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	-	8	0.5	-
	Rankin Bank	✓	✓	✓			✓	✓		✓						✓				✓		✓		✓	✓	✓	✓		✓			-	-	-	1	0.5	-
	Abrolhos Islands AMP	✓	✓	✓	✓		✓	✓	✓	✓													✓	✓	✓	✓	✓		✓			-	-	-	0.5	-	-
Islands	Montebello Islands (including State Marine Park)	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	1	0.5	-
	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserves)	✓	✓		✓		✓		✓			✓		✓		✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		-	0.5	-	1.5	-	-

[32] 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																						Socioeconomic and Cultural					Socio-cultural EMBA		Ecological EMBA			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*				*Other Communities / Habitats*						*Protected Species*									*Other Species*												
		Open water – (pristine)	*Marine Sediment – (pristine)*	*Coral reef*	*Seagrass beds / Macroalgae*	*Mangroves*	*Spawning/nursery areas*	*Open water – Productivity/upwelling*	*Non-biogenic reefs*	*Offshore filter feeders and/or deepwater benthic communities*	*Nearshore filter feeders*	*Sandy shores*	*Estuaries / tributaries / creeks / lagoons (including mudflats)*	*Rocky shores*	*Cetaceans – migratory whales*	*Cetaceans – dolphins and porpoises*	*Dugongs*	*Pinnipeds (sea lions and fur seals)*	*Marine turtles (foraging and internesting areas and significant nesting beaches)*	*Sea snakes*	*Whale sharks*	*Sharks and rays*	*Seabirds and/or migratory shorebirds*	*Pelagic fish populations*	*Resident /Demersal Fish*	*Fisheries – commercial*	*Fisheries – traditional*	*Tourism and Recreation*	*Protected Areas / Heritage – European and Indigenous / Underwater Cultural Heritage*	*Offshore Oil and Gas Infrastructure (topside and subsea)*	Surface hydrocarbon (1-10 g/m^2)	Accumulated hydrocarbons (10–100 g/m^2)	Surface hydrocarbon (≥10 g/m^2)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m^2)
	Muiron Islands (WHA, State Marine Park)	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓		-	-	-	1.5	-	-
Mainland (nearshore waters)	WA Coastline	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	0.5	-	1.5	-	-
	Ningaloo Coast (North, Middle & South; WHA, and State Marine Park)	□	□	□	□	□	□	□		□		□	□	□	□	□	□		□	□	□	□	□	□	□	□		□	□		-	-	-	3	-	-

Summary of Potential Impacts to environmental values(s)
In the event of a 2000 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 (13% and 3% probability respectively) and Gascoyne AMP (8% and 0.5% probability respectively). All other sensitive locations identified in **Table 6-23** are predicted to have a 1.5% probability or less of contact at concentrations >500 ppb. 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. Surface hydrocarbons above 10 g/m^2 are predicted to contact the Montebello AMP only, with a low probability of 2%. 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 **Section 6.8.2**. The hydrocarbon EMBA for the PAP is based on both the loss of well containment EMBA the marine diesel EMBA, as at points, the marine diesel EMBA extends further than the loss of well containment EMBA. Therefore, the potential impacts of entrained hydrocarbons provided in **Section 6.8.2**, and the scale of impact described provides a suitable assessment for potential impacts of a 2000 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 naphthalenes 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 Barrow Island and 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. A foraging BIA for wedge-tailed shearwaters overlaps the PAA, although other species of seabird may also be present in low numbers. 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 and Ningaloo AMP and 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 Commonwealth and State fisheries (see **Section 4.9.3**) 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 between >60–200 m depth, or pelagic species which are highly mobile. Therefore, a marine diesel spill is expected to only result in negligible impacts, considering that hydrocarbons are confined to the upper layers of the water column. Visible surface hydrocarbons at or exceeding 1 g/m^2 may also occur up to ~70 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.

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 is Moderate based on a Minor consequence, to marine fauna, AMPs, KEFs and commercial fishing, and a highly unlikely likelihood.

Control Considered	Control Feasibility (F) and Cost/Sacrifice (CS)[33]	Benefit in Impact/Risk Reduction	Proportionality	Control Adopted
Legislation, Codes and Standards				
Marine Order 30 (Prevention of Collisions) 2016, including: • adherence to steering and sailing rules including maintaining look-outs (e.g. visual, hearing, radar	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirements to be followed, reduces the likelihood of interference with other	Controls based on legislative requirements – must be adopted.	Yes **C 12.1**

[33] Qualitative measure

etc.), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar) • adherence to navigation light display requirements, including visibility, light position/shape appropriate to activity • adherence to navigation noise signals as required.		marine users resulting in a collision.		
Marine Order 21 (Safety and emergency arrangements) 2016, including: adherence to minimum safe manning levels maintenance of navigation equipment in efficient working order (compass/ radar) navigational systems and equipment required are those specified in Regulation 19 of Chapter V of *Safety of Life at Sea* automatic Identification System that provides other users with information about the vessel's identity, type, position, course, speed, navigational status and other safety-related data.	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirements to be followed reduce the likelihood of interference with other marine users resulting in a collision.	Controls based on legislative requirements – must be adopted.	Yes **C 12.2**
Establishment of a 500 m petroleum safety zone around MODU (and decommissioning vessel if required) 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 5.2**
Arrangements supporting the activities in the OPEP (per **Table 7-8**) 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 12.3**
Marine Order 27 (safety of navigation and radio equipment) 2016: • maintenance of navigation equipment in efficient working order (compass/radar) • navigational system and equipment required are those specified in	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 12.4**

Regulation 19 of Chapter V of Safety of Life at Sea • Automatic Identification System that provides other users with information about the vessel's identity, type, position, course, speed, navigational status and other safety-related data.				
Good Practice				
Support vessel on standby as required during the PAP to assist in third-party vessel interactions. When a support vessel is designated for standby it will undertake actions to prevent unplanned interactions, such as: • maintain a 24-hour radio watch on designated radio channel(s) • undertake continuous surveillance and warn the MODU/ installation vessel of any approaching vessels reaching 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.	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 12.5**

• 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.				

Australian Hydrographic Office (AHO) will be notified of activities and movements no less than four working weeks prior to commencement of the Petroleum Activities Program.	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 5.3**
Notify relevant government departments, fishing industry representative bodies and licence holders 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 5.4**
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 5.5**
Develop a SIMOPS Plan to manage interactions with other facilities / vessels, if required.	F: Yes. CS: Minimal cost. Standard practice.	SIMOPS Plan contains detail such as communications requirements, exclusion zones and entry/exit requirements and roles and responsibilities – which can help reduce likelihood of vessel collision.	Benefits outweigh cost/sacrifice. Control is also Standard Practice.	Yes **C 12.6**
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 12.7**
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 2.7.1**), 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. 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 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 stakeholder 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.

Environmental Performance Outcomes, Standards and Measurement Criteria

Outcomes	*Controls*	*Standards*	*Measurement Criteria*
EPO 12 No release of hydrocarbons to the marine environment due to a vessel collision associated with the Petroleum Activities Program.	**C 12.1** Marine Order 30 – Prevention of collisions – 2016, including: • adherence to steering and sailing rules including maintaining look-outs (e.g. visual, hearing, radar, etc), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar) • adherence to navigation light display requirements, including	**PS 12.1** MODU and project vessels compliant with Marine Order 30 (Prevention of Collisions) 2016 (which requires vessels to be visible at all times) to prevent unplanned interaction with marine users.	**MC 12.1.1** Marine Assurance inspection records demonstrate compliance with standard maritime safety procedures (Marine Orders 21 and 30).

	visibility, light position/shape appropriate to activity • adherence to navigation noise signals as required.		
	C 12.2 Marine Order 21 (Safety and emergency arrangements) 2016, including: • adherence to minimum safe manning levels	**PS 12.2** MODU and project vessels compliant with Marine Order 21 (Safety and emergency arrangements) 2016 to prevent unplanned interaction with marine users.	
	C 5.2 **See Section 6.7.5**	**PS 5.2** **See Section**	**MC 5.2.1** **See Section 6.7.5**
			MC 5.2.2 **See Section 6.7.5**
	C 12.3 Arrangements supporting the activities in the OPEP (per **Table 7-8**) will be tested to ensure the OPEP can be implemented as planned.	**PS 12.3.1** Exercises/tests will be conducted in alignment with the frequency identified in **Table 7-10**.	**MC 12.3.1** Testing of arrangement records confirm that emergency response capability has been maintained.
		PS 12.3.2 Testing of arrangement records confirm that emergency response capability has been maintained.	**MC 12.3.2** Emergency Management dashboard confirms that minimum level of personnel trained for core OPEP roles are available.
	C 12.4 Marine Order 27 (safety of navigation and radio equipment) 2016: • maintenance of navigation equipment in efficient working order (compass/radar) • navigational system and equipment required are those specified in Regulation 19 of Chapter V of Safety of Life at Sea • Automatic Identification System that provides other users with information about the vessel's identity, type, position, course, speed, navigational status and other safety-related data.	**PS 12.4** MODU and project vessels compliant with Marine Order 27 (Safety of navigation and radio equipment) 2016 to prevent unplanned interaction with marine users.	**MC 12.4.1** Marine Assurance inspection records demonstrate compliance with standard maritime safety procedures (Marine Order 27).

	C 12.5 Support vessel on standby as required during the PAP to assist in third-party vessel interactions. When a support vessel is designated for standby it will undertake actions to prevent unplanned interactions, such as: • Maintain a 24-hour radio watch on designated radio channel(s) • Perform continuous surveillance and warn the MODU/ installation vessel of any approaching vessels reaching 500 m petroleum safety zone. Surveillance shall be conducted by a combination of: • visual lookout • radar watch • other electronic systems available including Automatic Identification System (AIS) • monitoring any additional/agreed radio communications channels • all other means available. • While complying with the International Regulations for Preventing Collisions at Sea (COLREGS), approach any vessel attempting to transit through the 500 m zone and contact vessel by all available means. • Monitor and advise the MODU if: • MODU navigation signals are defective • visibility becomes restricted. • Advise if any buoys in the area are not holding position or are not working as expected.	**PS 12.5** 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 12.5.1** Records of non-conformance against controls maintained.
	C 5.3 **Refer Section 6.7.5**	**PS 5.4** **Refer Section 6.7.5**	**MC 5.4** **Refer Section 6.7.5**

	C 5.4 **Refer Section 6.7.5**	**PS 4.5** **Refer Section 6.7.5**	**MC 4.5.1** **Refer Section 6.7.5**
	C 5.5 **Refer Section 6.7.5**	**PS 4.5** **Refer Section 6.7.5**	**MC 4.5.1** **Refer Section 6.7.5**
	C 12.6 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 12.6** MODU and applicable vessels compliant with SIMOPS Plan	**MC 12.6.1** Up-to-date and approved SIMOPS Plan in place
	C 12.7 DP specific ASOGS procedure	**PS 12.7** Follow ASOG guidelines	**MC 12.7.1** 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 Hydrocarbon Release: Bunkering

Context		
Relevant Activities Project vessels – **Section 3.7**	**Existing Environment** Physical Environment – **Section 4.4** 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***
Loss of hydrocarbons (diesel/jet fuel) to marine environment from bunkering/ refuelling		X			X		A	E	1	M	LCS GP	Broadly Acceptable	**EPO 13**

Description of Source of Impact

Diesel LOC from bunkering

Bunkering of marine diesel between support vessels and the MODU 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 five minutes, resulting in approximately 50 m^3 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.

Given the limited volume of the potential release and offshore location no modelling has been undertaken as it is within significantly less than the 2000 m^3 of MDO in **Section 6.8.2.**

Impact Assessment

Potential impacts to environmental values

A spill at the surface as a result of bunkering activities is likely to be localised with limited potential contact with sensitive receptor locations based on the modelling presented in **Section 6.7.2** for a larger spill (2000 m^3), which predicted the spill to be restricted to open offshore waters.

The biological consequences of such a small volume spill on identified open water sensitive receptors relate to the potential for minor impacts to megafauna, plankton and fish populations (surface and water column biota) that are within the spill-affected area. No impacts to commercial fisheries are expected. Refer to **Section 6.7.2** (potential impacts of unplanned hydrocarbon release to the marine environment from vessel collision) for the detailed potential impacts. However, the extent of the EMBA associated with a marine diesel spill from loss during bunkering will be much reduced in terms of spatial and temporal scales, and hence, potential impacts from bunkering are considered slight.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that other hydrocarbon spills to the marine environment from bunkering 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)**[34]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
Marine Order 91 (Marine pollution prevention – oil) 2014, requires SOPEP/SMPEP (as appropriate to vessel class).	F: Yes. CS: Minimal cost. Standard practice.	By ensuring a SOPEP/SMPEP is in place for the vessel, the likelihood of a spill entering the marine environment is reduced. Although no significant reduction in consequence could result, the overall risk is reduced.	Controls based on legislative requirements – must be adopted.	Yes **C 8.4**
DP specific ASOGS procedure	F: Yes. CS: Minimal cost. Standard practice.	Reduced the likelihood of an unplanned release	Benefits outweigh cost/sacrifice	Yes **C 12.7**
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	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 13.1**

[34] Qualitative measure

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[34]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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.				
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	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 13.2**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[34]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
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.				
Professional Judgement – Eliminate				
No refuelling of helicopter on MODU, MOU, WIV.	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/MOU/WIV brought into port to refuel.	F: No. Does not eliminate the fuel transfer risk. It is not operationally practical to transit MODU/MOU/WIV back to port for refuelling based on the frequency of the refuelling requirements and distance from the nearest port.	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

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[34]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	CS: Significant due to schedule delay and vessel transit costs and day rates.			
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 2.7.1**), Woodside considers the adopted controls appropriate to manage the risks and consequences of an unplanned release of hydrocarbons. 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 accidental discharge of hydrocarbons as a result of bunkering failure represents a moderate current risk rating and is unlikely to result in a risk consequence greater than Minor. BIAs within the PAA include the flatback turtle internesting, whale shark foraging, pygmy blue whale migration and wedge-tailed shearwater breeding and foraging areas. 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. 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 of a loss of hydrocarbons during bunkering / refuelling to a level that is broadly acceptable.				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 13 No unplanned loss of hydrocarbons to the marine environment from bunkering greater than a consequence level of E[35]	**C 8.4** **See Section 6.7.7**	**PS 8.4** **See Section 6.7.7**	**MC 8.4.1** **See Section 6.7.7**

[35] Defined as 'Slight, short-term local impact (less than one year), on species, habitat (but not affecting ecosystem function), physical or biological attributes'.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
during the Petroleum Activities Program.	**C 12.7** **Refer Section 6.8.3**	**PS 12.7** **Refer Section 6.8.3**	**MC 12.7.1** **Refer Section 6.8.3**
	C 13.1 Bunkering equipment controls: • All hoses that have a potential environmental risk following damage or failure shall be placed on the MODU's preventative maintenance system. • All bulk transfer hoses shall be pressure-tested 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 13.1.1** To ensure damaged equipment is replaced prior to failure.	**MC 13.1.1** Records confirm the MODU bunkering equipment is subject to systematic integrity checks.
		PS 13.1.2 All diesel transfer hoses to have dry break couplings and pressure rating suitable for intended use.	**MC 13.1.2** Records confirm presence of dry break of couplings and flotation on fuel hoses.
		PS 13.1.3 To ensure adequate resources are available to allow implementation of SOPEP.	**MC 13.1.3** Records confirm presence of spill kits.
	C 13.6 Contractor procedures include requirements to be implemented during bunkering/refuelling operations, including: • A completed PTW and/or JSA shall be implemented for the hydrocarbon bunkering/refuelling operation. • Visual monitoring of gauges, hoses, fittings and the sea surface during the operation. • Hose checks prior to commencement. • 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.	**PS 13.6** Compliance with Contractor procedures for the management of bunkering/helicopter operations.	**MC 13.6.1** Records demonstrate bunkering/refuelling undertaken in accordance with contractor bunkering procedures.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	Hydrocarbons shall not be transferred in marginal weather conditions.		
Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are presented in **Appendix D**.			

6.8.5 Unplanned Discharge: Deck and Subsea Spills

Context		
Relevant Activities Drilling Activities – **Section 3.6** Vessel Operations – **Section 3.9** MODU Operations – **Section 3.9.1** ROV Operations – **Section 3.9.8** Contingency Activities – **Section 3.10**	**Existing Environment** Marine Regional Characteristics – **Section 4.2**	**Stakeholder Consultation** 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 hydrocarbons/ chemicals from MODU and project vessels deck activities and equipment, from subsea ROV hydraulic leaks		X		X	X		A	E	1	L	LCS GP	Broadly Acceptable	EPO 14
Accidental discharge of drilling 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		X		X	X		A	E	1	L			
Subsea release of hydraulic fluid from geotechnical and geophysical survey equipment		X		X	X		A	F	2	L			

Description of Source of Impact

Vessel, MODU and ROV Operations

Deck spills can result from spills from stored hydrocarbons/chemicals or equipment. Project vessels typically store hydrocarbon/chemicals in various volumes (20 L, 205 L; up to approximately 4000–6000 L). Storage areas are typically set up with effective primary and secondary bunding to contain any deck spills. Releases from equipment are predominantly from the failure of hydraulic hoses, which can either be located within bunded areas or outside of bunded or deck areas (e.g. over water on cranes). Helicopter refuelling may also take place within the PAA, on the helipad of the MODU and project vessels.

Chemicals that will be used and may be accidentally released include:

- non process chemicals (maintenance and cleaning chemicals)
- non process hydrocarbons - i.e. hydraulic fluids used in machinery (including cranes, winches, ROVs), small volumes of fuel
- drilling and well fluids.

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. 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.

Drilling Fluids - Transfers

A project vessel will undertake bulk transfer of mud or base oil to the MODU, if and when required. 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^3 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 m³. In total, it is expected that this catastrophic failure would result in a loss of 5.3 m³.

Failure of either of the slip joint packers at a rate not large enough to trigger the alarms could result in an undetected loss of 20 bbl (3 m³) maximum assuming a loss rate of 10 bbl/hr and that MODU personnel would likely walk past the moon pool at least every two hours.

Loss of a drilling chemical container or drum during transfer from the supply vessel to the MODU may occur due to crane operator error or machinery failure. The maximum container that could be lost is an intermediate Bulk Container (IBC) which can hold 1 m³ of chemicals. In the event that an IBC or drum is lost to the marine environment and cannot be recovered the contents will discharge, either immediately or over a period depending on the damage to the drum or container.

NWBM Drilling Fluid System

The selection of a NWBM drilling fluid system (if required) will be based on Woodside processes; however, for the purposes of this risk assessment, an example base oil (Saraline 185V) has been used. Saraline 185V is a mixture of volatile to low volatility hydrocarbons. Predicted weathering of base oil, based on typical conditions in the region, indicates that about 50% by mass is predicted to evaporate over the first day or two (refer to **Table 6**). 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 6-29: 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

All chemicals that may be released or discharged to the marine environment during the Petroleum Activities Program are assessed as per Woodside Chemical Selection and Assessment. This procedure is used to demonstrate that the potential impacts of the chemicals that may be released are acceptable and ALARP.

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.

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 m3)
- 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.

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 less than 10 L.

Geotechnical Survey Equipment

Survey vessels will place equipment on the seabed during the geotechnical survey which may contain relatively small volumes, about 5-10 L, depending on the system, of hydraulic fluid. The hydraulic fluid enables various mechanical functions to be performed. Some of the equipment requiring the supply of hydraulic fluid includes sources such as PCPT. PCPT involves pushing a penetrometer (probe) into the seabed at a constant rate of penetration to continuously measure the resistance, friction and water pressure. There is the potential for hoses and seals associated with these systems to fail (i.e. hoses burst or crack) during operation, or leaks as a result of shifts in temperature or pressure can result in small volumes of hydraulic fluid being released to the marine environment.

Towed Equipment

If a Chirp, Boomer or Sparker system is used, the receiver will consist of individual hydrophone elements located within neutrally buoyant, synthetic hydrocarbon-filled tubing. They typically contain approximately 8 to 12 hydrophone elements evenly spaced in approximately 100 m long, 25 mm diameter tubes. The cable will hold approximately 5 L of hydrophone fluid. The hydrophone cable has the potential to be punctured, resulting a leakage of fluid for a variety of reasons, including damage during deployment or retrieval.

Impact Assessment

Potential impacts to environmental values

Water Quality

Change in 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.

The worst-case drilling fluid or cement unplanned discharge is 8 m^3 which could occur during bulk transfer from the supply vessel to the MODU during drilling. These discharges would be to the sea surface and would rapidly dilute through mixing by surface currents and wave action.

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, the magnitude of any potential impact of a change in water quality is Slight. Receptor sensitivity of water quality is low (open ocean), and therefore the consequence of a release of hydrocarbons/chemicals on water quality is Negligible (F).

Marine Fauna

Injury or Mortality to Marine Fauna

As a result of a change in water quality, further impacts to receptors may occur, which include injury or mortality to marine fauna resulting from exposure to toxins in the released chemicals/hydrocarbons. 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. 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.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that other hydrocarbon/chemical spills 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)[36]	Benefit in Impact/Risk Reduction	Proportionality	Control Adopted

[36] Qualitative measure

Legislation, Codes and Standards				
Marine Order 91 (marine pollution prevention—oil) 2014, requires Shipboard Oil Pollution Emergency Plan (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 8.4**
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 14.2**
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 14.1**
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.	Requirements for deck drainage and management of oily water would reduce the likelihood of contaminated deck drainage water being discharged to the marine environment. No change in consequence would occur.	Benefits outweigh cost/sacrifice.	Yes **C 8.3**
For project activity fluids, periodic chemical reviews are performed.	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 9.1**
Contractor procedure for managing project fluids transfers onto, around and	F: Yes. CS: Minimal cost. Standard practice	Reduces the likelihood of an unplanned release occurring.	Benefits outweigh cost/sacrifice.	Yes **C 14.3**

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.	for Woodside to review contractor systems prior to performing activity.	Although no change in consequence would occur, the reduction in likelihood decreases the overall risk, providing environmental benefit.		
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	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 14.4**

• base fluid storage.				
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 14.5**
Decommissioning and survey 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 14.6**
Spill response procedures e.g. 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 D**
Regular maintenance of umbilical components/subsea equipment and inspection prior to deployment and during subsequent deployment events	F: Yes. CS: Minimal cost. Standard practice.	Reduce likelihood of deck spills	Benefits outweigh cost/sacrifice.	Yes **C 14.7**
Professional Judgement – Eliminate				
No additional controls identified				
Professional Judgement – Substitute				
Only use WBM during drilling.	F: Not feasible. While the base case is to use WBM, a contingent NWBM drilling fluid system is required for safety and technical reasons; therefore option to use must be maintained. CS: Not considered – control not feasible.	Not considered – control not feasible.	Not considered – control not feasible.	No
Professional Judgement – Engineered Solution				
Use a MODU which may have a larger tank storage capacity for WBM. As such, there would be fewer bulk transfer movements.	F: Not feasible. The use of a MODU with greater storage capacity cannot be confirmed. CS: Significant cost and schedule delay would occur if the	Not considered – control not feasible.	Not considered – control not feasible.	No

	MODU was limited to greater storage capacity.			
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/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. 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 Slight. BIAs within the PAA include the flatback turtle internesting, whale shark foraging, pygmy blue whale migration and distribution, and wedge-tailed shearwater breeding and foraging areas. 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.

Environmental Performance Outcomes, Standards and Measurement Criteria

Outcomes	*Controls*	*Standards*	*Measurement Criteria*
EPO 14	**C 8.3** **See Section 6.7.7**	**PS 8.3** **See Section 6.7.7**	**MC 8.3.1** **See Section 6.7.7**

No unplanned releases of deck and subsea spills to the marine environment inside the PAA greater than a consequence level of E[37] during the Petroleum Activities Program.	**C 8.4** **See Section 6.7.7**	**PS 8.4** **See Section 6.7.7**	**MC 8.4.1** **See Section 6.7.7**
	C 14.1 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 14.1** MODU's joint packer designed and maintained to reduce hydrocarbons discharged to the environment.	**MC 14.1.1** Records demonstrate that MODU's joint packer is compliant.
	C 14.2 Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily.	**PS 14.2** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 14.2.1** Records confirms all liquid chemicals and fuel are stored in bunded/secondarily contained areas when not being handled/moved temporarily.
	C 9.1 **Refer Section 6.7.8**	**PS 9.1** **Refer Section 6.7.8**	**MC 9.1.1** **Refer Section 6.7.8**
	C 14.3 Contractor procedure for managing project fluids transfers onto, around and off the MODU, which requires: • emergency shutdown systems for stopping losses of containment (e.g. burst hoses) • break-away dry-break couplings for oil-based mud hoses • transfer hoses to have flotation devised to allow detection of a leak • the valve line-up will be checked prior to commencing mud transfers • constant monitoring of the transfer process • direct radio communications • completed PTW and JSA showing contractor	**PS 14.3** Compliance with Contractor procedures to limit accidental loss to the marine environment.	**MC 14.3.1** Records demonstrate drilling fluid transfers are performed in accordance with the applicable contractor procedures.

[37] "Slight, short term impacts (<1 year) as in **Table 2-3**.

	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.		
	C 14.4 Check for the functionality of: • additional SCE (augers and cuttings dryers) • mud tanks • mud tank room • transfer hoses • NWBM base fluid transfer lines • NWBM base fluid transfer station • base fluid storage.	**PS 14.4.1** Prevents unacceptable use or discharge of NWBM/base oil	**MC 14.4.1** Records demonstrate the functionality of the specified equipment.
	C 14.5 Spill kits positioned in high risk locations around the rig (near potential spill points such as transfer stations).	**PS 14.5** Spill kits to be available for use to clean up deck spills.	**MC 14.5.1** Records confirms that spill kits are present, maintained, and suitably stocked.
	C 14.6 Decommissioning and survey vessels have self-containing hydraulic oil drip tray management system.	**PS 14.6** To contain any on-deck spills of hydraulic oil.	**MC 14.6.1** Records demonstrate decommissioning and survey vessels are equipped with self-containing hydraulic oil drip tray management system.
	C 14.7 Regular maintenance of umbilical components/subsea equipment and inspection prior to deployment and during subsequent deployment events	**PS 14.7** Umbilical components/subsea equipment maintained and inspected prior to use.	**MC 14.7.1** Records demonstrate compliance with drip tray management system
Detailed preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are present in **Appendix D.**			

6.8.6 Unplanned Discharge: Hazardous and Non – Hazardous Solid Waste/Equipment

Context		
Relevant Activities Project Vessels and Support Activities – **Section 3.9**	**Existing Environment** Marine Regional Characteristics – **Section 4.2**	**Stakeholder Consultation** 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 loss of hazardous or non-hazardous solid wastes / equipment to the marine environment		X			X		A	F	1	L	LCS GP	Broadly Acceptable	EPO 15

Description of Source of Impact

The MODU and project vessels will generate a variety of solid wastes, including packaging and domestic wastes such as aluminium cans, bottles, paper and cardboard. Hence, there is the potential for solid wastes to be lost overboard to the marine environment.

Equipment may also be accidentally lost overboard. Equipment that has been recorded as being lost on previous campaigns has primarily been windblown or dropped overboard and has included things such as personal protective equipment and small tools or materials.

These events have occurred during backloading activities, periods of adverse weather and incorrect waste storage.

Impact Assessment

Potential impacts to environmental values

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 and changes to aesthetic values. 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 Quality

Change in Water Quality

Hazardous solid wastes such as paint cans, oily rags, etc., can have the potential to cause localised contamination of the water through a release of toxins and chemicals. The level of impact to water quality will depend on the nature of the discharge, however volumes of the hazardous components are generally low (such as residual paint in cans or oily rags). Modelling of small volumes of hydrocarbons such as this (e.g. Shell, 2010) indicate rapid dilution in the offshore marine environment, with impacts limited to the immediate vicinity of the contamination.

Given likely small volumes, and the occasional nature of the event, these would result in temporary and highly localised changes to the water quality.

Based on the detailed risk evaluation, the magnitude of potential impact of a change in water quality is expected to be highly localised. Receptor sensitivity is low for water quality, leading to a consequence of No Lasting Effect (F).

Seabirds and Migratory Shorebirds, Fish, Marine Reptiles and Marine Mammals

Injury/Mortality to Fauna

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 (Department of the Environment and Energy (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 and the location of the activities at significant distance from sensitive habitats. 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.

While the threat abatement plan for impacts of marine debris on vertebrate marine life does not list explicit management actions for non-related industries (Department of Environment, Water, Heritage and the Arts (DEWHA), 2009), management controls will reduce the risk of unplanned discharge of solid waste.

The magnitude of potential impact to marine fauna is Minor, which results in a consequence of Minor (D) based on the high receptor sensitivity.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that the accidental discharge of solid waste described will result in slight, short-term impacts to environmental receptors (i.e. Environment Impact – E).

Demonstration of ALARP

Control Considered	Control Feasibility (F) and Cost/Sacrifice (CS)[38]	Benefit in Impact/Risk Reduction	Proportionality	Control Adopted
Legislation, Codes and Standards				
Marine Order 95 – marine pollution prevention—garbage (as appropriate to vessel class), prescribes matters necessary to give effect to Annex V of MARPOL, which prohibits the discharge of all garbage into the sea, except as provided otherwise.	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirements to be followed reduces the likelihood of an unplanned release. The consequence is unchanged.	Controls based on legislative requirements – must be adopted.	Yes **C 8.1**
Good Practice				
Drilling and Completions Waste Management Plan, which requires:	F: Yes. CS: Minimal cost. Standard practice.	Controls outlined in the management plan will reduce the likelihood of an unplanned release.	Benefit outweighs cost sacrifice.	Yes **C 15.1**

[38] Qualitative measure

• 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.		The consequence is unchanged.		
Project vessel waste arrangements, which require: • dedicated waste segregation bins • records of all waste to be disposed, treated or recycled • waste streams to be handled and managed according to their hazard and recyclability class. • implementation of waste management procedures which provide for safe handling and transportation, segregation and storage and appropriate classification of all waste generated.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of an unplanned release. The consequence is unchanged.	Benefit outweighs cost sacrifice.	Yes **C 15.2**
MODU, project vessels, ROV, or crane may be	F: Yes.	Occurs after an unplanned release of	Benefit outweighs cost sacrifice.	Yes

used to attempt recovery of hazardous solid wastes lost overboard. Where safe and practicable, this activity will consider: • risk to personnel to retrieve object • whether the location of the object is in recoverable water depths object's proximity to subsea infrastructure ability to recover the object (i.e. nature of object, lifting equipment or, and suitable weather).Any material dropped objects/waste that remain in the title will undergo an impact assessment and be added to the inventory.	CS: Minimal cost. Standard practice.	solid waste and therefore no change to the likelihood. Since the waste objects may be recovered, a reduction in consequence is possible.		**C 15.3**
Professional Judgement – Eliminate				
No additional controls identified.				
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 accidental loss of hazardous or non-hazardous solid wastes/equipment 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, accidental discharge of solid waste represents a low current risk rating that is unlikely to result in a potential impact greater than no lasting effect (less than one month) based on a localised impact not significant to environmental receptors. 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 legislative requirements (Marine Order 95). 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.				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 15 No unplanned releases of solid hazardous or non-hazardous waste to the marine environment inside the PAA greater than a consequence level of E[39] during the Petroleum Activities Program	**C 8.1** **See Section 6.7.7**	**PS 8.1** **See Section 6.7.7**	**MC 8.1.1** **See Section 6.7.7**
	C 15.1 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 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.	**PS 15.1** Hazardous and non-hazardous waste will be managed in accordance with the Drilling and Completions Waste Management Plan.	**MC 15.1.1** Records demonstrate compliance against Drilling and Completions Waste Management Plan.
	C 15.2 Project vessel waste management arrangements, which require: • dedicated waste segregation bins • records of all waste to be disposed, treated or recycled • waste streams to be handled and managed according to their hazard and recyclability class • implementation of waste management procedures which provide for safe handling and transportation, segregation and storage and appropriate classification of all waste generated.	**PS 15.2** Hazardous and non-hazardous waste will be managed in accordance with the project vessel waste management arrangements.	**MC 15.2.1** Records demonstrate compliance against project vessel waste management arrangements.

	C 15.3 MODU/project vessel ROV, crane or project vessel may be used to attempt recovery of solid wastes /equipment lost overboard. Where safe and practicable for this activity will consider: • risk to personnel to retrieve object • whether the location of the object is in recoverable water depths • object's proximity to subsea infrastructure • ability to recover the object (i.e. nature of object, lifting equipment or, ROV availability and suitable weather). Any material dropped objects / waste that remain in the title will undergo an impact assessment and be added to the inventory.	**PS 15.3** Any solid waste /equipment dropped to the marine environment will be recovered where safe and practicable to do so.	**MC 15.3.1** Records detail the recovery attempt consideration and status of any waste /equipment lost to marine environment.
		PS 15.3.2 Where retrieval is not practicable and / or safe, material items (property) that are lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title.	**MC 15.3.2** First Priority records demonstrate outcomes of the safe and practicable evaluation, including an impact assessment for the objects remaining.
			MC 15.3.3 Records demonstrate that material items left in title are added to the inventory.

[39] "Slight, short term impacts (<1 years) as in **Table 2-3**.

6.8.7 Physical Presence (Unplanned): Seabed Disturbance from Dropped Objects and Anchor Drag

Context		
Relevant Activities MODU Operations – **Section 3.9** Vessel Operations – **Section 3.9** Geophysical and Geotechnical Survey activities – **Section 3.6.6**	**Existing Environment** Marine Regional Characteristics – **Section 4.2**	**Stakeholder Consultation** 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	X			X			A	E	1	L	GP	Broadly Acceptable	EPO 16
Failed MODU mooring leading to anchor drag and the disturbance of benthic habitat	X			X									

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 mooring failure and subsequent anchor drag during MODU operations if a moored MODU is used for the Petroleum Activities Program.

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

During drilling, it is intended that the MODU will be secured on station by an 8 to 12-point pre-laid mooring system eployed to the seabed. Additionally, during anchor/chain hold testing, up to ten locations in the Survey Operational Area may be separately tested using a fifteen tonne anchor, or a section of anchor chain. High energy weather events such as cyclones, occurring while the MODU or AHV 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 or AHV 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.

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.

Geotechnical Site Survey

There is potential for the CPT probe to be left in the seabed if attempts at removal are unsuccessful. This is considered highly unlikely due to the soft and consistent sediment that characterises the region, meaning retrieval of the CPT probes should be relatively uncomplicated with a high likelihood of successful removal. Typical CPT probes range from 25 mm to 133 mm in diameter and are made entirely of steal. A probe left in the seabed may remain below the mudline or could extend up to ~1 m above the mudline. In the highly unlikely event that removal from a vessel is not possible, Woodside will undertake an assessment as to whether recovery can be done via another method.

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

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 Continental Slope Demersal Fish Communities KEF 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 the KEF (**Figure 4-10**). 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.

Any unplanned seabed disturbance within the KEF would be relatively small compared to the size of the KEF. There will be no substantial adverse effect on the KEF or the communities within it. On this basis, any impacts are expected to be slight.

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, 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 Negligible (F) 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 only slight impacts to a small area of the seabed and a small proportion of the benthic population. However, no significant impact to environmental receptors and resulting in minor and short-term impacts (i.e. Environment Impact – E).

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[40]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
No additional controls identified.				
Good Practice				
The MODU/ decommissioning 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 16.1**
MODU/ decommissioning 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 16.2**
Specifications and requirements for station keeping equipment (mooring systems), require that: systems are tested and inspected in accordance with API RP 21 systems have sufficient capability	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 16.3**

[40] Qualitative measure

such that a failure of any single component 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 7.4**
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 16.4**
Apply safe work procedures to prevent dropped objects from survey vessel and during deployment and retrieval of geophysical/ geotechnical equipment.	F: Yes. CS: Minimal cost. Standard practice.	Reduce likelihood a geophysical and geotechnical survey equipment being left on the seabed	Benefit outweighs cost sacrifice.	Yes **C 16.5**
C 15.3 MODU/project vessel ROV, crane or project vessel may be used to attempt recovery of solid wastes /equipment lost overboard. Where safe and practicable for this activity will consider: • risk to personnel to retrieve object • whether the location of the object is in recoverable water depths • object's proximity to subsea infrastructure • ability to recover the object (i.e. nature of object, lifting	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.	Benefit outweighs cost sacrifice.	Yes **C 15.3**

equipment or, ROV availability and suitable weather). Any material dropped objects / waste that remain in the title will undergo an impact assessment and be added to the inventory.				
Survey vessel inductions include control measures and training for crew in 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.	Benefit outweighs cost sacrifice.	Yes **C 16.9**
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
No additional controls identified				
Professional Judgement – Engineered Solution				
MODU tracking equipment operational when the MODU unmanned.	F: Yes. CS: Minimal cost. Standard practice.	Although no reduction in consequence would occur, the overall risk is reduced as the location of the MODU would be known at all times and response times could be improved in the event of a loss of station keeping.	Benefit outweighs cost sacrifice.	Yes **C 16.11**

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.

Environmental Performance Outcomes, Standards and Measurement Criteria

Outcomes	*Controls*	*Standards*	*Measurement Criteria*
EPO 16	**C 16.1**	**PS 16.1**	**MC 16.1.1**

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
No incidents of dropped objects or anchor/chain hold drag to the marine environment inside the PAA greater than a consequence level of D[41] during the Petroleum Activities Program.	The MODU/ decommissioning 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.	All lifts conducted in accordance with applicable MODU/ decommissioning vessel work procedures to limit potential for dropped objects.	Records show lifts conducted in accordance with the applicable MODU/ decommisoining vessel work procedures.
	C 16.2 MODU/ decommissioning vessel inductions include control measures for dropped object prevention.	**PS 16.2** To ensure awareness of requirements for dropped object prevention.	**MC 16.2.1** Records show dropped object prevention training is provided to the MODU/ decommissioning vessel.
	C 16.3 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 16.3** MODU mooring system tested and in place to ensure no complete mooring failure.	**MC 16.3.1** Records demonstrate mooring system tests and inspection.
	C 7.4 **Refer Section 6.7.6**	**PS 7.4.1** **Refer Section 6.7.6**	**MC 7.4.1** **Refer Section 6.7.6**
	C 16.4 Mooring system is tested to recommended tension as per API RP 2SK	**PS 16.4** Monitoring compliant with ISO 19901-7:2013	**MC 16.4.1** Records confirm mooring system is tested to recommended tension as per API RP 2SK.

[41] Minor, short-term impact (1-2 years), as in **Table 2-3**.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	C 16.5 Apply safe work procedures to prevent dropped objects from survey vessel and during deployment and retrieval of geophysical/ geotechnical equipment.	**PS 16.5.1** Operational procedures will be in-place on board the vessel for deployment and retrieval of geophysical/ geotechnical equipment.	**MC 16.5.1** Records confirm that survey vessel holds Safe Work procedures for deployment and retrieval of survey equipment.
	C 15.3 **Refer Section 6.8.6**	**PS 15.3** Any solid waste /equipment dropped to the marine environment will be recovered where safe and practicable to do so.	**MC 15.3.1** Records detail the recovery attempt consideration and status of any waste /equipment lost to marine environment.
		PS 15.3.2 Where retrieval is not practicable and / or safe, material items (property) that are lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title.	**MC 15.3.2** First Priority records demonstrate outcomes of the safe and practicable evaluation, including an impact assessment for the objects remaining.
			MC 15.3.3 Records demonstrate that material items left in title are added to the inventory.
	C 16.9 Survey vessel inductions include control measures and training for crew in dropped object prevention.	**PS 16.9** Crew inductions, and job safety analyses where relevant, will include a component on preventing dropped objects to increase awareness of requirements.	**MC 16.9.1** Records show dropped object prevention is covered in survey vessel inductions.
	C 16.11 Moored MODU tracking equipment operational when the MODU unmanned.	**PS 16.11** Tracking of the MODU is possible when the MODU is unmanned.	**MC 16.11.1** Records show the moored MODU has functional tracking equipment for instances when MODU is unmanned.

6.8.8 Physical Presence (Unplanned): Collision with Marine Fauna

Context		
Relevant Activities Project vessels – **Section 3.9**	**Existing Environment** Protected Species – **Section 4.6**	**Stakeholder Consultation** 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 collision between MODU/project vessels and protected marine fauna					X		A	E	1	L	LCS	Broadly Acceptable	EPO 17

Description of Source of Impact

Vessel Operations

Activities associated with the Petroleum Activities Program will require vessels for geotechnical and geophysical surveys, subsea installation, 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.

Project vessels operating in and around the PAA may present a potential hazard to protected marine fauna, including cetaceans (e.g. pygmy blue whales), whale sharks and marine turtles. 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. Factors that contribute to the frequency and severity of impacts due to collision vary greatly due to vessel type, vessel operation (specific activity, speed), physical environment (e.g. water depth), the type of animal potentially present and their behaviours.

Project vessels would typically be stationary or moving at low speeds when supporting the Petroleum Activities Program; support vessels typically transit to and from the PAA between two and four trips per week (e.g. to port).

Impact Assessment

Potential impacts to environmental values

Project vessels operating in and around the PAA may present a potential hazard to marine mammals and other protected marine fauna, such as marine turtles. 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), or mortality. Marine fauna are also at risk of mortality through being caught in thrusters during station keeping operations (dynamic positioning).

The likelihood of vessel/fauna 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. Project vessels within the PAA are likely to be travelling <8 knots (and will often be stationary) within the 500 m zone for the MODU. At times, vessels will be transiting between wells where speed could be up to a maximum of about 15 knots, however these would only be transitory through the area. Therefore, the chance of a vessel collision with protected species resulting in a lethal outcome is considered unlikely.

The risk of marine life getting caught in operating thrusters is unlikely, given the low presence of individuals, combined with the avoidance behaviour commonly displayed during dynamic positioning operations.

Marine Mammals

As described above, vessel speed influences the probability of a vessel collision with a cetacean and also whether a collision may result in lethal injury (Vanderlaan and Taggart, 2007). Additionally, behaviour of individuals may also influence the likelihood of a collision occurring. Although large cetaceans are expected to show localised avoidance in response to vessel noise, studies have reported limited behavioural response to approaching ships (McKenna et al., 2015) and individuals engaging in behaviours such as feeding, mating or nursing may be less aware of their surroundings and more susceptible to collision (Laist et al., 2001).

No known key aggregation areas for marine mammals (resting, breeding or feeding) are located within or immediately adjacent to the PAA. However, a migration pygmy blue whale BIA overlaps the PAA and individuals may occasionally be present during seasonal migrations (**Section 4.6.3**). One species of dolphin were identified that may occur in the PAA. However, most dolphins show preference for coastal habitats over deep offshore waters. This reduces the likelihood of dolphin species being encountered in the PAA and interacting with project vessels.

The risk of lethal injury to a large whale as a result of a vessel strike is estimated to be less than 10% at a speed of 4 knots (Vanderlaan and Taggart, 2007). Vessel-whale collisions at this speed are uncommon and, based on reported data contained in the NOAA database (Jensen and Silber, 2004) there are only two known instances of collisions when the vessel was travelling at less than 6 knots; both of these were from whale-watching vessels that were deliberately positioned amongst whales

Smaller cetaceans, such as dolphins, comprise a lower proportion of vessel collision records (DoEE, 2016), though it is difficult to determine if this is due to a lower collision rate or lower detection rate of incidents. Dolphins often engage in bow riding which may make them more vulnerable to entanglement with propellers or thrusters compared to larger cetaceans.

Marine Reptiles

The Recovery Plan for Marine Turtles in Australia recognises turtles are at risk from vessel strikes, particularly in shallow coastal foraging habitats and internesting areas where there are high numbers of recreational and commercial vessels (Commonwealth of Australia, 2017). Whilst an internesting buffer overlaps the PAA, considering the offshore location, it is expected that the presence of marine turtles would be unlikely and only comprise individuals transiting the open, offshore waters for short periods of time. It is expected that individuals will respond to vessel presence by avoiding the immediate vicinity of the vessels and, combined with low vessel speed, will reduce the likelihood of a vessel-turtle collision.

It is unlikely that vessel movement associated with the Petroleum Activities Program will have a significant impact on marine fauna populations, given the low presence of transiting individuals and the low operating speed of the support vessels (generally <8 knots or stationary, unless operating in an emergency).

Fish, sharks and rays

Vessel strikes are recognised as a key threat to recovery by the Approved Conservation Advice for whale sharks (TSSC, 2015). Whale sharks are at risk from vessel strikes when feeding at the surface or in shallow waters (where there is limited option to dive). The defined foraging BIA (northward from Ningaloo along the 200 m isobath) overlaps with the PAA, and whale sharks may traverse the PAA between March to November during their migration. Given the duration of activities within PAA and the slow speeds at which project vessels operate, collisions with transiting individual whale sharks are considered unlikely.

Smaller fish may also be at risk of injury or mortality from vessels through being caught in thrusters during station keeping operations (i.e. DP). However, this is unlikely given the low presence of individuals, combined with the avoidance behaviour commonly displayed during station keeping operations.

Marine Fauna Summary

Potential impacts from collision with marine fauna will not result in a substantial adverse effect on a population or the spatial distribution of the population. Additionally, no adverse impact on marine ecosystem functioning or integrity or impacts to lifecycles of the population of migratory whales will occur.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that a collision, were it to occur, will not result in a potential impact greater than slight, short-term impact on species (i.e. Environment Impact – E).

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[42]**	**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[43]: • Project vessels will not travel faster than six 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	F: Yes. CS: Minimal cost. Standard practice.	Implementation of these controls will reduce the likelihood of a collision between a cetacean, whale shark or turtle occurring. The consequence of a collision is unchanged.	Controls based on legislative requirements – must be adopted.	Yes **C 17.1**

[42] Qualitative measure

[43]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)[42]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
speed of less than six knots. • Vessels will not travel faster than eight knots within 250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.				
Good Practice				
Variation of the timing of the Petroleum Activities Program to avoid whale and whale shark migration periods.	F: Not feasible. Schedule of activities to be determined and migration seasons may not be able to be avoided. CS: Not considered – control not feasible	Not considered – control not feasible	Not considered – control not feasible	No
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
The use of dedicated MFOs on the project vessels for the duration of each activity to watch for whales and provide direction on and monitor compliance with Part 8 of the EPBC Regulations.	F: Yes, however vessel bridge crews already maintain a constant watch during operations. CS: Additional cost of MFOs considered unnecessary.	Given support vessel bridge crews already maintain a constant watch during operations, additional MFOs would not significantly further reduce the risk.	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 potential vessel collision with protected marine fauna. 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				

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[42]**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
The impact assessment has determined that, given the adopted controls, vessel collision with marine fauna represents a low current risk rating that is unlikely to result in a potential impact greater than slight and short-term disruption to 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 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.				

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 17 No vessel strikes with protected marine fauna (whales, whale sharks, turtles) during the Petroleum Activities Program.	**C 17.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[44]: • Project vessels will not travel faster than six 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 six knots.	**PS 17.1.1** Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) Interacting with cetaceans to minimise potential for vessel strike.	**MC 17.1.1** Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.
		PS 17.1.2 All vessel strike incidents with cetaceans will be reported in the National Ship Strike Database (as outlined in the Conservation Management Plan for the Blue Whale—A Recovery Plan under the EPBC Act 1999, Commonwealth of Australia, 2015).	**MC 17.1.2** Records demonstrate reporting cetacean ship strike incidents to the National Ship Strike Database.

[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, close standby cover for overside working and emergency situations.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	• Vessels will not travel faster than eight knots within 250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.		

6.8.9 Physical Presence (Unplanned): Accidental Introduction and Establishment of Invasive Marine Species

Context		
Relevant Activities Installation of Subsea Infrastructure – **Section 3.6** MODU Operations – **Section 3.9** Vessel Operations – **Section 3.9**	**Existing Environment** Marine Regional Characteristics – **Section 4.2**	**Consultation** 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*
Introduction and establishment of invasive marine species (IMS) within the PAA				X	X	X	A	E	0	L	LCS	Broadly Acceptable	EPO 18

Description of Source of Impact

Installation of Subsea Infrastructure, and MODU and Vessel Operations

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, WIV, MOU, AHV, installation vessel or general support vessels (**Section 3.9**)

All vessels are subject to some level of marine fouling whereby organisms attach to the vessel hull. This could particularly occur in areas where organisms can find a good attachment 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 onboarding of ballast water as cargo is loaded or to balance vessels under load.

During the Petroleum Activities Program, project vessels have the potential to introduce IMS to the PAA through marine fouling (containing IMS) on vessels as well as within high risk ballast water discharge. Cross contamination between vessels can also occur (e.g. IMS translocated between project vessels) during times when vessels need to be alongside each other.

Impact Assessment

Potential impacts to environmental values

IMS are a subset of Non-Indigenous Marine Species (NIMS) that have been introduced into a region beyond their natural biogeographic range resulting in impacts to social/cultural, human health, economic and/or environmental values. NIMS are species that have the ability to survive, reproduce and establish founder populations. However, not all NIMS introduced into an area will thrive or cause demonstrable impacts; the majority of NIMS around the world are relatively benign and few have spread widely beyond sheltered ports and harbours. NIMS are only considered IMS when they result in impacts to environmental values and/or have social/cultural, economic and/or human health impacts.

Once introduced, IMS may prey on 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. These changes to the local marine environment result in changes to the natural ecosystem.

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 detected 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.

Potential IMS have historically been introduced and translocated around Australia by a variety of natural and human means, including marine fouling and ballast water. Potential IMS vary from one region to another depending on various environmental factors such as water temperature, salinity, nutrient levels and habitat type, which dictate their survival and invasive capabilities. IMS typically require hard substrate in the photic zone; therefore, requiring shallow waters to become established. Highly-disturbed, shallow-water environments such as shallow coastal waters, ports and marinas are more susceptible to IMS colonisation, whereas IMS are generally unable to successfully establish in deep-water ecosystems and open-water environments where the rate of dilution and the degree of dispersal are high.

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.

Benthic productivity on the outer continental shelf and slope is low, and is a function of water depth, low nutrient availability, and the absence of hard substrates. Studies completed within the region indicate that benthic composition in deep-water habitats is generally lower in abundance than shallow water habitats of the region (DEWHA, 2008; Brewer et al., 2007). As described in Section 4.5, A survey of the nearby Balnaves Development seafloor recorded sparse (< 5% cover) epibenthic fauna such as anemones, urchins, sea whips, sea pens feathers stars and glass sponges (RPS, 2011b). Infauna consisted of polychaetes and crustaceans. Benthic communities in the PAA are representative of the wider region.

While project vessels have the potential to introduce IMS into the PAA, the deep offshore open waters of the PAA (~83 - 258 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 not credible.

Accordingly, impact to epifauna/infauna in the PAA is not considered credible. Receptor sensitivity for epifauna and infauna is low, leading to a Negligible (F) risk consequence.

Industry, Shipping, Defence

The establishment of IMS has the potential to cause changes to the functions, interests or activities of other users through indirect impact such as changes to fisheries target species resulting in economic and social implications, or due to compromised reputation to the oil and gas industry.

Given the low likelihood of IMS translocation to, and colonisation of environments within the PAA, project activities will not result in establishment of IMS, and as such not adversely affect other marine user activities in the region.

Based on the impact evaluation, the magnitude of potential impacts of a change to the functions, interests or activities of other users is slight (see **Table 6-24**). 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 environmental values(s)

In support of Woodside's assessment of the risks and consequences of IMS introduction associated with the Petroleum Activities Program, Woodside conducted a risk and impact evaluation of the different aspects of a marine pest translocation. The results of this assessment are presented in **Table 6-24**.

As a result of this assessment, Woodside has presented the highest potential consequence as a Slight (E) and likelihood as Remote (0), resulting in an overall Low risk following the implementation of identified controls.

Table 6-24: Credibility, consequence and likelihood of introducing IMS

IMS Introduction Location	Credibility of Introduction	Consequence of Introduction	Likelihood
Introduced to PAA and establishment on the seafloor or subsea structures	**Not Credible** The deep offshore open waters of the PAA, away from shorelines and/or critical habitat, more than 40 km from a shoreline and in waters more than 80 m deep are not conducive to the settlement and establishment of IMS.		

Introduced to PAA and establishment on a project vessel.	**Credible** There is potential for the transfer of marine pests between project vessels within the PAA.	**Environment – Not Credible** The translocation of IMS from a colonised MODU or project vessel to shallower environments via natural dispersion is not considered credible given the distances of the PAA from nearshore environments (i.e. greater than 12 nm/50 m water depth). There is therefore no credible environmental risk and the assessment is 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.	**Remote (0)** Interactions between project vessel will be limited during the Petroleum Activities Program, with minimum 500 m safety exclusion zones being adhered to around the MODU and installation vessel, and interactions limited short periods of time alongside (i.e. during backloading, bunkering activities). There is also no direct contact (i.e. they are not 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 between project vessels and from project vessels to other marine environments beyond the PAA.	**Not Credible** This risk is considered so remote that it is not credible for the purposes of the activity. The transfer of a marine pest between project vessels was already considered remote, given the offshore open ocean environment (i.e. transfer pathway discussed above). For a marine pest to then establish into a mature spawning population on the new project vessel (which would have been through Woodside's IMS process) and then transfer to another environment is not considered credible (i.e. beyond the Woodside risk matrix). Project vessels will be located in an offshore, open ocean, deep environment, where IMS survival is implausible. Furthermore, this marine pest once transferred would need to survive on a new vessel with good vessel hygiene (i.e. has been through Woodside's risk		

	assessment process) and survive the transport back from the PAA to shore. In the event it was to survive this trip, it would then need to establish a viable population in nearshore waters.

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)**[45]	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
Project 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.	Reduces the likelihood of transferring marine pests between survey 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 18.1**
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 Operational Area. No change in consequence would occur.	Controls based on legislative requirements under the *Biosecurity Act 2015* – must be adopted.	Yes **C 18.2**
Good Practice				
Woodside's IMS risk assessment process[46] will be applied to the MODU, project vessels and relevant immersible equipment undertaking the Petroleum Activities Program. Assessment will consider these risk factors: For vessels/ MODU: • vessel/MODU/ type • recent IMS inspection and cleaning history, including for internal niches • out-of-water period before mobilisation	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 18.3**

[45] Qualitative measure

[46] 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				
• 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.				
Professional Judgement – Eliminate				
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	Not assessed, control not feasible.	Not assessed, control not feasible.	No

Demonstration of ALARP				
	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.			
Eliminate use of MODU/vessels.	F: No. Given that vessels must be used to implement project, there is no feasible means to eliminate the source of risk. CS: Loss of the project.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Professional Judgement – Substitute				
Source project 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	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				
	competing Oil and Gas activities in the region. In addition, sourcing Australian based vessels only will cause increases in cost due to pressures of vessel availability. CS: Significant cost and schedule impacts due to restrictions of vessel hire opportunities.			
IMS inspection of all vessels.	F: Yes. Approach to inspect vessels could be a feasible option. CS: Significant cost and schedule impacts. In addition, Woodside's IMS risk assessment process (**C 13.2**) is seen to be more cost effective as this control allows Woodside to manage the introduction of marine pests through biofouling, while targeting its efforts to and resources to areas of greatest concern.	Inspection of all vessels for IMS would reduce the likelihood of IMS being introduced to the PAA. However, this reduction is unlikely to be significant given the other control measures implemented. No change in consequence would occur.	Disproportionate. The cost/sacrifice outweighs the benefit gained, as other controls to be implement achieve an ALARP position.	No
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 IMS introduction. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of ALARP			
Demonstration of Acceptability			
Acceptability Statement The impact assessment has determined that, given the adopted controls the introduction of IMS as not credible, following the implementation of identified controls (likelihood of Remote). However, given the potential consequence (E) an IMS introduction may result in a slight, short-term (<1 year). 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 invasive marine species to an acceptable level.			
Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 18 No introduction and establishment of invasive marine species into the PAA as a result of the Petroleum Activities Program.	**C 18.1** Project vessels will manage their ballast water using one of the approved ballast water management options, as specified in the Australian Ballast Water Management Requirements.	**PS 18.1** Prevents the translocation of IMS within the vessel's ballast water from high risk locations to the PAA.	**MC 18.1.1** Ballast Water Records System maintained by vessels which verifies compliance against Australian Ballast Water Management Requirements.
	C 18.2 Internationally sourced project vessels will manage their biosecurity risk associated with biofouling as specified in the Australian Biofouling Management Requirements.	**PS 18.2** Compliance with Australian Biofouling Management Requirements.	**MC 18.2.1** Records of implementation of biofouling management measure and pre-arrival reporting.
	C 18.3 Woodside's IMS risk assessment process[47] will be applied to the MODU, project vessels and relevant immersible equipment undertaking the Petroleum Activities Program. Assessment will consider these risk factors: For vessels/ MODU: vessel/MODU/ type recent IMS inspection and	**PS 18.3.1** 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 18.3.1** Records of IMS risk assessments maintained for all project vessels and relevant immersible equipment entering the PAA or IMS management area to undertake the Petroleum Activities Program.
		PS 18.3.2 In accordance with Woodside's IMS risk assessment process, the IMS risk assessments will be undertaken by an authorised environment adviser who has completed relevant Woodside	**MC 18.3.2** Records confirm that the IMS risk assessments undertaken by an Environment Adviser or IMS inspector (as relevant).

[47] 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			
	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	IMS training or by qualified and experienced IMS inspector	

Demonstration of ALARP			
	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

As described in **Section 1.10.2.1,** an EP must not be inconsistent with a recovery plan or threat abatement plan for a listed threatened species or ecological community. 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 Australian Sea Lion (Neophoca cinerea) (Commonwealth of Australia, 2013).
- Recovery Plan for the Grey Nurse Shark (Carcharias taurus) 2014 (Commonwealth of Australia, 2014).
- Sawfishes and River Sharks Multispecies Recovery Plan (Commonwealth of Australia, 2015b).
- Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans 2018 (Commonwealth of Australia, 2018).

Table 6-25 lists the objectives and (where relevant) the action areas of these plans, and also describes whether these objectives/action areas are applicable to government, the Titleholder and/or the Petroleum Activities Program. For those objectives/action areas applicable to the Petroleum Activities Program, the relevant actions of each plan have been identified, and an evaluation has been conducted as to whether impacts and risks resulting from the activity are clearly inconsistent with that action or not. The results of this assessment against relevant actions are presented in **Table 6-26** to **Table 6-31.**

The assessment of potential impacts and risks to pygmy blue whales from underwater noise emissions in **Section 6.6.3** has taken into account the definitions of terminology in the CMP, as described in the DAWE and NOPSEMA guidance released in September 2021. Similarly, the assessment against relevant actions in the CMP in **Table 6-20** has been undertaken in the context of the definitions included in the guidance note.

Table 6-25: 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. Adaptively 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		
B. Enabling and measuring recovery			
B1. Determine trends in index beaches	Y	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

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
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
Australian Sea Lion Recovery Plan			
Overarching Objective			
To halt the decline and assist the recovery of the Australian sea lion throughout its range in Australian waters by increasing the total population size while maintaining the number and distribution of breeding colonies with a view to: • improving the population status leading to the future removal of the Australian sea lion 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			
Mitigate interactions between fishing sectors (commercial, recreational and Indigenous) and the Australian sea lion to enable the recovery of all breeding colonies	Y		
Mitigate the impacts of marine debris on Australian sea lion populations	Y	Y	Y
Mitigate the impacts of aquaculture operations on Australian sea lion populations	Y		
Investigate and mitigate other potential threats to Australian sea lion populations, including disease, vessel strike, pollution and tourism	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
Continue to develop and implement research and monitoring programs that provide outputs of direct relevance to the conservation of the Australian sea lion	Y	Y	
Increase community involvement in, and awareness of, the recovery program	Y		
Grey Nurse Shark Recovery Plan			
Overarching Objective			
To assist the recovery of the grey nurse shark in the wild, throughout its range in Australian waters, with a view to: • improving the population status, leading to future removal of the grey nurse shark from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder the recovery of the grey nurse shark in the near future, or impact on the conservation status of the species in the future	Y	Y	Y
Specific Objective			
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		
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	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
• ensuring that anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future			
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		
Marine Debris Threat Abatement Plan			
Objectives			
Contribute to long-term prevention of the incidence of marine debris	Y	Y	Y
Understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations	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 6-26: 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 and H-WA – no relevant actions	Refer **Section 6.8.6** **Not inconsistent assessment**: The assessment of accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to marine turtles.	**EPO 15**
	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 H-WA – no relevant actions	Refer **Sections 6.8.2, 6.8.3, 6.8.4, 6.8.5 and Appendix D** **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 **Section 7.9** . Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are present in **Appendix D**
		Action: Routine discharges from MODU and project vessels are managed such that marine turtles are not adversely affected by changes in water quality. Priority actions at stock level: G-NWS – as above LH-WA, F-Pil – as above	Refer **Section 6.7.7** **Not inconsistent assessment:** The assessment of routine discharges of chemicals, deck drainage, treated sewerage, putrescible wastes and grey water has considered the potential risks to marine turtles. Individuals transiting the localised	**EPO 8**

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
		H-WA – no relevant actions	area may come into contact with routine discharges, however these are sporadic and in small quantities, and are unlikely to pose a significant risk.	
	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 and H-WA – manage artificial light from onshore and offshore sources to ensure biologically important behaviours of nesting adults and emerging/dispersing hatchlings can continue	Refer **Section 6.7.1** **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. Vessel light emissions could cause localised and temporary behavioural disturbance to isolated transient individuals, which is unlikely to result in displacement of adult turtles from internesting or nesting habitat critical to the survival of marine turtles.	**EPO 1**
	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 and H-WA – no relevant actions	**Not inconsistent assessment**: Woodside contributes to Action Area B1 via its support of the Ningaloo Turtle Program[48]. Given the offshore location of the PAA, impacts to turtle nesting beaches will not occur.	N/A

[48] http://www.ningalooturtles.org.au/media_reports.html

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
	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, F-Pil – no relevant actions H-WA – investigate mixed stock genetics at foraging grounds	Refer **Section 6.7.3** **Not inconsistent assessment**: The assessment of acoustic emissions has considered the potential impacts to flatback and olive ridley turtles. Vessel and seismic acoustic emissions could cause localised and short-term behavioural disturbance to isolated transient individuals, which is unlikely to result in displacement of adult turtles from internesting or nesting habitat critical to the survival of marine turtles.	**EPO 3, 4**
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 6-27: 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 **Section 6.7.3** **Not inconsistent assessment**: The assessment of acoustic emissions has considered the potential impacts to pygmy blue whales.	**EPO 3, 4**
	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	Refer **Section 6.8.8** **Not inconsistent assessment**: The assessment of vessel collision with marine fauna has considered the potential risks to	**EPO 17**

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
		occur and, if required, appropriate mitigation measures are implemented	pygmy blue whales. If the Petroleum Activities Program overlaps with the northern migration, individuals may deviate slightly from migratory route, but will continue on their migration to possible breeding grounds in Indonesian waters. Vessel collisions with pygmy blue whales are highly unlikely to occur, given the very slow vessel speeds and presence of MFOs.	
	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[49]).	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 6-28: Assessment against relevant actions of the Australian Sea Lion Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS

[49] Double, M.C., Andrews-Goff, V., Jenner, K.C.S., Jenner, M.-N., Laverick, S.M., Branch, T.A., Gales, N.J., 2014. Migratory movements of pygmy blue whales (*Balaenoptera musculus brevicauda*) between Australia and Indonesia as revealed by satellite telemetry. PloS One 9, e93578

Australian Sea Lion Recovery Plan	Investigate and mitigate other potential threats to Australian sea lion populations, including disease, vessel strike, pollution and tourism	Improve the understanding of—and where necessary mitigate—the threat posed to Australian sea lion populations by illegal killings, vessel strike, pollution and oil spills	Refer **Sections 6.8.2, 6.8.3, 6.8.4, 6.8.5 and Appendix D** **Not inconsistent assessment:** The species was identified to potentially occur within the EMBA and therefore the assessment of accidental release of hydrocarbons has considered the potential risks to Australian sea lions.	Refer **Section 7.9** . 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 Australian Sea Lion 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 6-29: Table 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	Improve understanding of the threat of pollution and disease to the grey nurse shark	Review and assess the potential threat of introduced species, pathogens and pollutants	Refer **Section 6.8.6** Not inconsistent assessment: The assessment of accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to grey nurse sharks.	**EPO 15**
			Refer **Sections 6.8.2, 6.8.3, 6.8.4, 6.8.5 and Appendix D** Not inconsistent assessment: The species was identified to potentially occur within the EMBA and therefore the assessment of accidental release of hydrocarbons has considered the potential risks to grey nurse sharks.	Refer **Section 7.9** . 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 6-30: Table Assessment against relevant actions of 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	Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species	Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks	Refer **Sections 6.8.2, 6.8.3, 6.8.4, 6.8.5 and Appendix D.** Not inconsistent assessment: The species was identified to potentially occur within the EMBA and therefore the assessment of accidental release of hydrocarbons has considered the potential risks to sawfish and river shark.	Refer **Section 7.9** Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are present in **Appendix D.**
	Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species	Assess the impacts of marine debris including ghost nets, fishing gear and plastics on sawfish and river shark species	Refer **Section 6.8.6.** Not inconsistent assessment: The assessment of accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to sawfish and river sharks.	**EPO 15**
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 6-31: Assessment against relevant Marine Debris Threat Abatement Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Marine Debris TAP	**Objective 1:** Contribute to long-term prevention of marine debris.	**Action 1.02**: Limit the amount of single use plastic material lost to the environment in Australia.	Refer **Section 6.8.6.** **Not inconsistent assessment**: The assessment of accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to vertebrate wildlife.	**EPO 15**
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.				

7 IMPLEMENTATION STRATEGY

7.1 Overview

Regulation 14 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 environmental risks and impacts are continually being reduced to ALARP and are acceptable, and that EPOs and standards outlined in this EP are achieved.

Woodside, as Operator, is responsible for ensuring the Petroleum Activities Program is managed in accordance with this Implementation Strategy and the WMS (see **Section 1.9**).

7.2 Systems, Practice and Procedures

All operational activities are planned and carried out in accordance with relevant legislation and standards, management measures (i.e. controls) identified in this EP and internal environment standards and procedures (**Section 6**).

The systems, practices and procedures that will be 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 Assessment of Project Fluids

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 are acceptable, ALARP and meet Woodside's expectation for environmental performance.

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

All chemical substances on the OCNS ranked list of registered products have an assigned ranking based on toxicity and other relevant parameters, such as biodegradation and bioaccumulation, in accordance with one of two schemes (as shown in **Figure 7-1**):

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

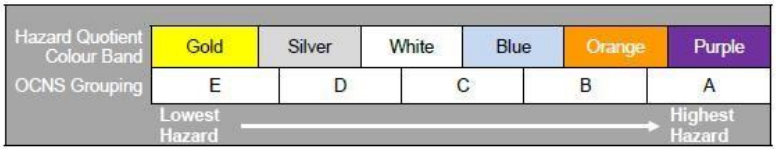


Figure 7-1: OCNS ranking scheme

Chemicals fall into the following assessment types:

- No further assessment: Chemicals with an HQ band of Gold or Silver or an OCNS ranking of E or D with no substitution or product warnings do not require further assessment. Such chemicals do not represent a significant impact on the environment under standard use scenarios and are therefore considered ALARP and acceptable.
- Further assessment/ALARP justification required: The following types of chemicals require further assessment to understand the environmental impacts of discharge into the marine environment:
    - chemicals with no OCNS ranking
    - chemicals with an HQ band of White, Blue, Orange or Purple or an OCNS ranking of A, B or C
    - chemicals with an OCNS product or substitution warning.

This includes assessing the ecotoxicity, biodegradation and bioaccumulation of the chemicals in the marine environment in accordance with the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Hazard assessment and the Department of Mines and Petroleum (DMP) Chemical Assessment Guide: Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline.

Ecotoxicity

Chemical ecotoxicity is assessed using the criteria used by CEFAS to group chemicals based on ecotoxicity results (**Table 7-1**). If a chemical has an aquatic or sediment toxicity within the criteria for the OCNS grouping of D or E, this is considered acceptable in terms of ecotoxicity.

Table 7-1: CEFAS OCNS grouping based on ecotoxicity results

Initial Grouping	A	B	C	D	E
Results for aquatic-toxicity data (ppm)	<1	>1-10	>10-100	>100-1000	>1000
Results for sediment toxicity data (ppm)	<10	>10-100	>100-1000	>1000-10,000	>10,000

Note: Aquatic toxicity refers to the Skeletonema costatum EC50, Acartia tonsa LC50 and Scophthalmus maximus (juvenile turbot) LC50 toxicity tests; sediment toxicity refers to Corophium volutator LC50 test.

Biodegradation

The biodegradation of chemicals is assessed using the CEFAS biodegradation criteria, which align with the categorisation outlined in the DMP Chemical Assessment Guide: Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline.

CEFAS categorises biodegradation into the following groups:

- readily biodegradable: results of >60% biodegradation in 28 days to an OSPAR harmonised offshore chemical notification format (HOCNF) accepted ready biodegradation protocol
- inherently biodegradable: results >20% and <60% to an OSPAR HOCNF accepted ready biodegradation protocol or result of >20% by OSPAR accepted inherent biodegradation study
- not biodegradable: results from OSPAR HOCNF accepted biodegradation protocol or inherent biodegradation protocol are <20%, or half-life values derived from aquatic simulation test indicate persistence.

Chemicals with >60% biodegradation in 28 days to an OSPAR HOCNF accepted ready biodegradation protocol are considered acceptable in terms of biodegradation.

Bioaccumulation

The bioaccumulation of chemicals is assessed using the CEFAS bioaccumulation criteria, which align with the categorisation outlined in the DMP Chemical Assessment Guide: Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline.

The following guidance is used by CEFAS:

- non-bioaccumulative: Log Pow <3, or BCF ≤100 and molecular weight is ≥700
- bioaccumulative: Log Pow ≥3 or BC >100 and molecular weight is <700.

Chemicals that meet the non-bioaccumulative criteria are considered acceptable. If a product has no specific ecotoxicity, biodegradation or bioaccumulation data available, the following options are considered:

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

Alternatives

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

Decision

Once the further assessment/ALARP justification has been completed, the relevant environment adviser must concur that the environmental risk as a result of chemical use is ALARP and acceptable.

7.2.2 Woodside IMS risk assessment process

7.2.2.1 Objective and scope

To minimise the risk of introducing IMS as a result of the PAP, 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 the following:

- Vessels or immersible equipment that do not plan to enter the IMS Management Area (IMSMA)[50] or PAAs defined in environmental approvals
- 'New build' vessels launched less than 14 days prior to mobilisation

[50] MSMA is based on current legal framework and includes all nearshore waters around Australia, extending from the lowest astronomical tide 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).

- 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 zone[51]. 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 (AFC[52]).

7.2.2.2 Risk assessment process

Woodside's IMS risk assessment process was developed with regard to the national biofouling management guidelines for the petroleum production and exploration industry and guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species (IMO Guidelines, 2011).

In order to effectively evaluate the potential for vessels and immersible equipment to introduce IMS, a risk assessment process has been developed to score and evaluate the risk posed by each Project vessel, or immersible equipment planning to undertake activities within the IMSMA / PAA. The risk assessment process considers a range of factors, as listed in **Table 7-2** and **Table 7-3**.

The IMS risk assessments will be undertaken by a trained environment adviser who has completed relevant Woodside IMS training or by a qualified and experienced IMS inspector. A QA/QC process is implemented for all Woodside conducted IMS risk assessments where a secondary trained environment adviser verifies the assessment to minimise the risk of misapplication and errors within the risk assessment process.

Table 7-2: 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

[51] The Pilbara Zone includes Port, nearshore and offshore movements between Exmouth and Port Headland (excluding high environmental value areas, World Heritage Areas, Commonwealth Marine Reserve Sanctuary Zones and State Marine Management Areas and Marine Parks).

[52] 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 <12nm/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).

Factors	Details
	absent, the highest risk value is applied. If the AFC type is suitable the risk factor applied reduces with age since application.
Internal treatment systems	A risk reduction factor applied if the vessel has an internal biological fouling control system in place at the time of assessment, or evidence of manual dosing.
Vessel origin and proposed area of operation	Differing risk ratings are assigned in relation to the climatic relationship between the vessel's origin and the proposed climatic region of the proposed area of operation. Highest risk rating is applied to similar climatic regions.
Number of stationary/slow speed periods >7 days	A risk factor is calculated based on the number of 7 day periods that the vessel has operated at stationary or at low speed (less than three knots) in port or coastal waters which is any waters less than 50 metres deep outside 12 nautical miles from land or any waters within 12 nautical miles of land. The greater the number of periods the higher the risk factor applied.
Region of stationary or slow periods	A further multiplier is applied depending on the location of the stationary/slow speed periods. The highest risk rating applied if the stationary or slow speed periods occurred within ports or coastal waters of the same climatic region,
Type of activity – contact with seafloor.	The potential for the introduction of IMS varies on the planned vessel activity taking place. Those activities that come in contact with sediments and thus have the potential to accumulate and harbour IMS in areas such as hoppers (dredges) and spud cans (drilling rigs) are considered to have a greater risk of infection.

Table 7-3: Key factors considered as a part of the risk assessment process for immersible equipment

Factors	Details
Region of deployment since last thorough clean, particularly coastal locations	Climatic region of use since last overhaul, thorough cleaning or prolonged period out of water (>28 day). Highest risk rating is applied to similar climatic regions. Activities occurring in nearshore areas (less than 50 meters deep and/or within 12 nautical miles from land) are given the highest risk rating.
Duration of deployments	Maximum duration of deployment (maximum time in water) since last overhaul or thorough cleaning. The longer the period of immersion the higher the risk rating applied.
Duration of time out of water since last deployment	A further risk reduction factor can be applied for immersible equipment that has been out of the water for an extended period.
Transport conditions during mobilisation	If the equipment is stored in damp conditions then a high risk factor is applied, while if equipment is stored in dry and well ventilated (low humidity) conditions then a low risk factor is applied.
Post-retrieval maintenance regime.	A risk reduction factor is applied if the equipment/item of interest is routinely washed, cleaned, checked and/or dissembled between project sites. While a higher risk rating is applied where no routine cleaning occurs.

Following implementation of the risk assessment process, vessels and/or immersible equipment are classified as one of three risk categories, as defined below.

- 'Low'– Low risk of introducing IMS of concern and hence no additional management required, or management options have been applied to reduce the risk.
- 'Uncertain'– Risk of introducing IMS is not apparent and as such the precautionary approach is adopted, and additional management options may be required.
- 'High'– High risk of introducing IMS means additional management options are required prior to this vessel mobilising to the PAA.

Following the allocation of a 'low' risk rating for a vessel or immersible equipment, the information provided by the vessel operator for the purposes of risk assessment must be confirmed prior to mobilisation. For vessels or equipment classified as posing an 'uncertain' or 'high' theoretical risk, a

range of management options are presented to reduce this theoretical risk to acceptable levels and achieve a low risk status. These management options have been developed with the intention of reducing IMS risk to levels that are as low as reasonably practicable (i.e., ALARP). It is a flexible approach that allows for a range of management actions to be tailored for a specific vessel movement. These will be assessed on a case-by-case basis and may include, but not limited to, the following:

- Inspection (desktop, in-water or dry dock) by a suitably qualified and experienced IMS inspector to verify risk status. Where practicable, the inspection shall occur within seven days (but not more than 14 days) prior to final departure to the PAA.
- In-water or dry dock cleaning of the hull and other niche areas. This is typically applied where the risk assessment outcome is High risk driven by the age of the AFC on the vessel and its time spent in similar climatic region ports.
- Treatment of vessels internal seawater systems. This is typically applied in isolation for vessels with AFC applied to their hull within the last twelve months and where subsequent assessment through the process achieves a Low risk rating.
- Limiting the duration that the vessel spends within the IMSMA to a maximum of 48 hours (cumulative entries). This is applicable for Uncertain risk vessels only.
- Reject the vessel.

Project vessels and immersible equipment are required to be a low risk of introducing IMS prior to entering the PAA.

7.3 Roles and Responsibilities

Key roles and responsibilities for Woodside and contractor personnel relating to implementing, managing and reviewing this EP are described in **Table 7-4**. Roles and responsibilities for oil spill preparation and response are outlined in **Appendix D**and the *Woodside Oil Pollution Emergency Arrangements (Australia)*.

It is the responsibility of all Woodside employees and contractors to implement the Woodside *Corporate Health andSafety and Environment and Biodiversity Policies* (**Appendix A**) in their areas of responsibility and that the personnel are suitably trained and competent in their respective roles.

Table 7-4: Roles and responsibilities

Title (role)	Environmental Responsibilities
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. Ensures the MODU start-up meets the requirements of the Drilling and Managing Rig Operations Process.
Woodside Survey Project Activity Manager (or delegate/s)	Ensure the survey activities are undertaken as per this EP and approval conditions. Provide sufficient resources to implement the surveys-related management measures (i.e. controls, EPOs, PSs and MC) in this EP. Ensure survey vessel personnel are given an Environmental Induction as per **Section 7.4.2** this EP at the start of the survey activities. Confirm controls and performance standards in this EP are actioned, as required, before survey 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 7.4.2** 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 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.

Title (role)	Environmental Responsibilities
	Ensure MODU and project vessel personnel are given an Environmental Induction as per **Section 7.4.2** of this EP at the start of the drilling programs. Confirms controls and performance standards in this EP are actioned, as required, before drilling commences.
Woodside Drilling Engineers	Ensure changes to the drilling program are communicated to the Woodside Environmental Adviser. Ensure all drill and completions fluid chemical components and other fluids that may be used downhole have been reviewed by the Drilling and Completions Environmental Adviser.
Woodside 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 values and management systems.
Woodside Corporate Affairs Adviser	Prepare and implement the Stakeholder Consultation Plan for the Petroleum Activities Program. Report on stakeholder consultation. Ongoing liaison and notification as required as per **Section 7.8**.
Woodside Marine Assurance Superintendent	Conducts 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.
Woodside CIMT Duty Manager	On receiving notification of an incident, the Woodside CIMT Duty Manager 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 impact, risk and progress to the Crisis Management Team and stakeholders 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

Title (role)	Environmental Responsibilities
	address the broader public safety considerations conclude and review activities.
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.
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	Waste is managed on the MODU and sent to shore as per the Drilling and Completions Waste Management Plan.

Title (role)	Environmental Responsibilities
Vessel-based Personnel	
IVessel Master Activity Support Vessel Master	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 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.
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 and Safety and Environment and Biodiversity Policies (Appendix A) in their areas of responsibility and that the personnel are suitably trained and competent in their respective roles.

7.4 Training and Competency

7.4.1 Overview

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 MODU personnel, detailing awareness and compliance with the MODU and project vessel Contractor's environmental policy and environmental management system.

7.4.2 Inductions

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 an overview of pygmy blue whales.
- Regulations relevant to the activity.
- Woodside's Environmental Management System – Healthand Safety and Environment and Biodiversity Policies
- EP importance/structure/implementation/roles and responsibilities.
- Main environmental aspects/hazards and potential environmental impacts and related performance outcomes.
- Oil spill preparedness and response.
- Monitoring and reporting on performance outcomes and standards using MC.
- Incident reporting.

In addition, the inductions will cover the requirement that there will be no recreational fishing from the MODU and / or vessels.

7.4.3 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 MODU and project vessels which cover all crew. During these meetings, recent environmental incidents are regularly reviewed, and awareness material presented.

7.4.4 Pygmy Blue Whale Observation Training

Relevant crew onboard the MODU and decommissioning vessel will undertake PBW observation training prior to commencing activities. Woodside and Contractor personnel will be trained to deliver the PBW training ('train-the-trainer' model) by an external organisation specialising in marine environmental training, with expertise in marine fauna observations. Training materials will be developed by the external organisation in consultation with WEL, to ensure Project specific information is incorporated. The bespoke training package will cover:

- An overview of Project activities and the cetaceans that may be present during these activities
- An overview of the potential impacts and risks to PBW
- An overview of marine megafauna that may be present during activities.
- An overview of EP controls and management procedures relevant to PBW presence
- Different types of PBW behaviours inc. the difference between foraging and migrating, and how to identify these based on the latest information on persistence in the area, dive time and swimming speed (Owen et al. 2016; Australian Institute of Marine Science (AIMS) unpublished data 2021; Thums & Ferreira 2021);
- Precautionary approach to identification i.e. assume PBW if positive ID of different species type not possible;
- The observation and reporting requirements.

When trained crew are undertaking observations, expectations are that:

- Observation equipment / tools are used as required (i.e. range-finding binoculars, whale ID prompts etc.)
- Escalation process carried out if PBW are identified including alerting bridge crew so that appropriate response can be initiated
- Make and maintain records including the date, time and approximate distance from the vessel, and the action taken to comply with EPS

Records will be maintained as evidence of the personnel who have completed PBW observation training.

Completion of PBW Observation Training is a minimum requirement for those performing observations relevant to adaptive management measures in this EP (such as **C 3.2**).

For any trained crew who haven't conducted PBW observations for greater than 12 months, refresher training is required prior to undertaking the role.

7.4.5 Management of Training Requirements

All personnel on the 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.

7.5 Monitoring, Auditing, Management of Non-conformance and Review

7.5.1 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.

7.5.1.1 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 Global Wells and Seismic KPIs.
- Internal auditing and assurance program as described in **Section 7.5.2**.

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 7.5.2**.

7.5.1.2 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 Woodside consultation 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.

7.5.2 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 below.

7.5.2.1 MODU Activities

Internal auditing is performed on a MODU-specific schedule, rather than a schedule to align with each 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 will be tracked through the MODU or vessel compliance action register, a contractor register between the MODU operator or vessel contractor and Woodside.

7.5.2.2 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).

The internal audits and reviews, combined with the ongoing monitoring described in **Section 7.5.1**, 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 7.5.3**.

7.5.2.3 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 following marine assurance activities:

- Safety Management System Assessment
- Dynamic Positioning (DP) System Verification

- Vessel Inspections
- Project support for tender review, evaluation and pre/post contract award.

Vessel inspections are used to verify actual levels of compliance with the company's Safety Management System, the overall condition of the vessel and the status of the planned maintenance system onboard. Woodside Marine Assurance Specialist will conduct a risk assessment on the vessel to determine the level of assurance applied and the type of vessel inspection required.

Methods of vessel inspection may include, and are not limited to:

- Woodside Marine Vessel Inspection
- OCIMF 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 vesselinspection 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.

7.5.2.4 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.

7.5.3 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.

7.5.4 Review

7.5.4.1 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 Drilling and Completions Environment Team will perform six-monthly reviews of the effectiveness of the implementation strategy and associated tools. This will involve reviewing the:

- Drilling and Completions environment KPIs (leading and lagging).
- Tools and systems to monitor environmental performance (detailed in **Section 7.5.1**)
- Lessons learned about implementation tools and throughout each campaign.
- Reviews of oil spill arrangements and testing are performed in accordance with **Section 7.9**.

7.5.4.2 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 operators.
- Formal and informal industry benchmarking.
- Cross asset learnings.
- Engineering and technical authorities discipline communications and sharing.

7.5.4.3 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 7.6**).

7.6 Management of Change and Revision

7.6.1 EP Management of Change

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 3**) 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**); and potential new advice from external stakeholders (**Section 5**), will be managed in accordance with Regulation 17 of the Environment Regulations.

Risk will be assessed in accordance with the environmental risk management methodology (**Section 2.3**) 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 17 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 17 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.

7.6.2 OPEP Management of Change

Relevant documents from the OPEP will be reviewed in the following circumstances:

- 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 17 to determine if EP, including OPEP, resubmission is required (see **Section 7.6.1**). 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 the five-yearly revision.

7.7 Record Keeping

Compliance records (outlined in MC in **Section 6**) will be maintained.

Record keeping will be in accordance with Regulation 14(7) that addresses maintaining records of emissions and discharges.

7.8 Reporting

To meet the EPOs and standards outlined in this EP, Woodside reports at a number of levels, as outlined in the next sections.

7.8.1 Routine Reporting (Internal)

7.8.1.1 Daily Progress Reports and Meetings

Daily reports for drilling activities are prepared and issued to key support personnel and stakeholders, by relevant managers responsible for the well. The report provides performance information about drilling activities, heath, safety and environment, and 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.

7.8.1.2 Regular HSE 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.

7.8.1.3 Performance Reporting

Monthly and quarterly performance reports are developed and reviewed by the Function and Business Unit Leadership Teams (e.g. Global Wells and Seismic). 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.

7.8.2 Routine Reporting (External)

7.8.2.1 Ongoing Consultation

In accordance with Regulation 14 (9) 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's approach to ongoing consultation is that feedback and comments received from relevant persons and additional persons continue to be assessed and responded to, as required, through the life of an EP, including during EP assessment and throughout the duration of the accepted EP, in accordance with the intended outcome of consultation (as set out in **Section 5.2**).

Woodside proposes to undertake the engagements with directly impacted relevant persons and additional persons listed in **Table 7-5** Relevant new information identified during ongoing consultation will be assessed using the EP Management of Knowledge (refer to **Section 7.5.1.2** and Management of Change Process (refer to **Section 7.6**).

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, additional persons and those who are merely interested in the activities, can otherwise remain up to date on this activity through subscribing to 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 a measure or control that requires implementation or update to meet the intended outcome of consultation (see **Section 5.1**), Woodside will apply its EP Management of Knowledge process (refer to **Section 7.5.1.2**) and Management of Change process (refer to **Section 7.6**), as appropriate.

Woodside has established and maintains a publicly available, up to date and interactive map to provide stakeholders with updated information on activities being conducted as part of the

Petroleum Activities Program particularly during SIMOPS. The interactive map is available on Woodside's website (**Section 6.7.5, PS 6.2**).

The ongoing consultation engagements that Woodside intends to progress for this EP are set out in the table below.

Table 7-5: Ongoing consultation engagements

Report/ Information	Recipient	Purpose	Frequency	Content
Emails / Meetings	Relevant cultural authorities	Identification, assessment and consideration of cultural values relevant to the Operational Area and EMBA	Ongoing	Assessment of cultural values Any new information on cultural values will be assessed using the EP Management of Knowledge (ref to **Section 7.5**) and Management of Change Process (refer to **Section 7.6**).
Notification (email) Updates (email)	AHO	As requested by AMSA during consultation.	No less than 4 weeks prior to commencement. As required.	**PS 4.3** (**Section 6.7.1** Date of activity start. Changes to planned activities
Notification (email) Update (email)	AMSA	As requested by AMSA during consultation	At least 24-48 hours before operations commence. Provide updates to the AHO and JRCC should there be changes to the activity.	**PS 4.5** (**Section 6.7.1**) Date of activity start. Changes to planned activities
Notification (email)	DoD	As requested by DoD during consultation	Five weeks prior to commencement of activities.	**PS 4.8** (**Section 6.7.1**) Date of activity start.
Notification (email)	DMIRS	Good practice	At least 10 days prior to commencement	Date of activity start and end.
Notification (email)	DPIRD WAFIC Pilbara Line Fishery Pilbara Trap Fishery Recfishwest NERA CSEP	As requested during consultation and/or organisation	At least 10 days prior to commencement and following completion of activities.	**PS 4.4** (**Section 6.7.1**) Date of activity start and end.
Notification (email)	All relevant persons to the proposed activity	Notification of significant change	As appropriate	Notification of significant change

7.8.2.2 Start and End Notifications of the Petroleum Activities Program

In accordance with Regulation 29, 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.

7.8.2.3 Environmental Performance Review and Reporting

In accordance with applicable environmental legislation for the activity, Woodside is required to report information about environmental performance to the appropriate regulator. Regulatory reporting requirements are summarised in **Table 7-6**.

Table 7-6: Routine external reporting requirements

Report	Recipient	Frequency	Content
Monthly Recordable Incident Reports **(Appendix E)**	NOPSEMA	Monthly, by the 15th of each month.	Details of recordable incidents that have occurred during the Petroleum Activities Program for previous month (if applicable).
Environmental Performance Report	NOPSEMA	Annually, with the first report submitted within 12 months of the commencement of the Petroleum Activities Program covered by this EP (as per the requirements of Regulation 14(2).	Compliance with EPOs, controls and standards outlined in this EP, in accordance with the Environment Regulations.

7.8.2.4 End of the Environmental Plan

The EP will end when Woodside notifies NOPSEMA that the Petroleum Activities Program has ended and all of the obligations identified in this EP have been completed, and NOPSEMA has accepted the notification, in accordance with Regulation 25A of the Environment Regulations.

7.8.3 Incident Reporting (Internal)

The process for reporting environmental incidents is described in **Section 7.8.4** 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.

7.8.4 Incident Reporting (External) – Reportable and Recordable

7.8.4.1 Reportable Incidents

7.8.4.1.1 Definition

A reportable incident is defined under Regulation 4 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 2.6.3**)).
- 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 2.6.3**).

The environmental Risk assessment for the Petroleum Activities Program (**Section 6**) has not identified any risks with a potential consequence level of C+ for environment. All incidents with actual or potential environmental consequences will be investigated fully. Where an actual or potential environment consequence of C+ is identified this incident will still be classified as a reportable incident and appropriate notifications completed.

Any such incidents represent potential events which would be reportable incidents. Incident reporting is performed 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.

7.8.4.1.2 Notification

NOPSEMA will be notified of all reportable incidents, according to the requirements of Regulations 26, 26A and 26AA 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.

7.8.4.2 Recordable Incidents

Definition

A recordable incident as defined under Regulation 4 of the Environment Regulations is an incident arising from the activity that 'breaches an environmental performance outcome or environmental performance standard, in the EP that applies to the activity, that is not a reportable incident'.

Notification

NOPSEMA will be notified of all recordable incidents, according to the requirements of Regulation 26B(4), 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.

7.8.4.3 Other External Incident Reporting Requirements

In addition to the notification and reporting of environmental incidents defined under the Environment Regulations and Woodside requirements, **Table 7-7** describes the incident reporting requirements that also apply in the PAA.

Table 7-7: External Incident Reporting Requirements

Event	Responsibility	Notifiable party	Notification requirements	Contact	Contact detail
Any marine incidents during Petroleum Activities Program	Vessel Master	AMSA	Incident Alert Form 18 as soon as reasonably practicable* Within 72 hours after becoming aware of the incident, submit Incident Report Form 19	AMSA	reports@amsa.gov.au
Oil pollution incidents in Commonwealth waters	Vessel Master	AMSA Rescue Coordination Centre (RCC)	As per Article 8 and Protocol I of MARPOL within two hours via the national emergency 24-hour notification contacts and a written report within 24 hours of the request by AMSA	AMSA RCC Australia	If the ship is at sea, reports are to be made to: Free call: 1800 641 792 Phone: 08 9430 2100 (Fremantle)
Oil pollution incidents in Commonwealth waters	Vessel Master	AMSA	Without delay as per *Protection of the Sea Act*, part II, section 11(1), AMSA RCC notified verbally via the national emergency 24-hour notification contact of the hydrocarbon spill; follow up with a written Pollution Report ASAP after verbal notification	RCC Australia	Phone: 1800 641 792 or +61 2 6230 6811 AFTN: YSARYCYX
Any oil pollution incident which has the potential to	Vessel Master	DCCEEW	Reported verbally, ASAP	Director of National Parks	Phone: 02 6274 2220

Event	Responsibility	Notifiable party	Notification requirements	Contact	Contact detail
enter a National Park or requires oil spill response activities to be conducted within a National Park					
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

The following activities should also be reported to AMSA via RCC Australia by the Vessel Master:

- loss of plastic material
- garbage disposed of in the sea within 12 nm of land (garbage includes food, paper, bottles, etc)
- any loss of hazardous materials

For oil spill incidents, other agencies and organisations will be notified as appropriate to the nature and scale of the incident as per procedures and contact lists in the Oil Pollution Emergency Arrangements (Australia) and the Oil Pollution First Strike Plan (**Appendix H**).

External incident reporting requirements under the *OPGGS (Safety) Regulations*, including under Subregulation 2.42, notices and reports of dangerous occurrences will be reported to NOPSEMA under the approved activity safety cases.

7.9 Emergency Preparedness and Response

7.9.1 Overview

Under Regulation 14(8), the implementation strategy must contain an Oil Pollution Emergency Plan (OPEP) and provide for updating the OPEP. Regulation 14(8AA) outlines the requirements for the OPEP which must include adequate arrangements for responding to and monitoring 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 7-8**.

Table 7-8: Oil pollution and preparedness and response overview

Content	Environment Regulations Reference	Document/Section Reference
Details of (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 13(5), (6), 14(3)	Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**)
Describes the OPEP	Regulation 14(8)	EP: Woodside's oil pollution emergency plan has the following components: • Woodside Oil Pollution Emergency Arrangements (Australia) • Oil Pollution First Strike Plan (**Appendix H**) • Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**)
Details the arrangements for responding to and monitoring oil pollution (to inform response activities), including control measures	Regulation 14(8AA)	Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**) Oil Pollution First Strike Plan (**Appendix H**)
Details the arrangements for updating and testing the oil pollution response arrangements	Regulation 14(8), (8A), (8B), (8C)	EP: **Section 7.9.5** Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**)
Details of provisions for monitoring impacts to the environment from oil pollution and response activities	Regulation 14(8D)	Oil Spill Preparedness and Response Mitigation Assessment **(Appendix D**)

Content	Environment Regulations Reference	Document/Section Reference
Demonstrates that the oil pollution response arrangements are consistent with the national system for oil pollution preparedness and control	Regulation 14(8E)	Oil Pollution Emergency Arrangements (Australia)

7.9.2 Emergency Response Training

Regulation 14(5) 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 oil spill response. Following the mapping of training to Woodside identified competencies, training was then mapped to positions based on their required competencies.

Table 7-9: Minimum levels of competency for key IMT positions

IMT Position	Minimum Competency
Corporate Incident Management Team (CIMT) Leader	• Incident and Crisis Leadership Development Program (ICLDP) • IMO2 or equivalent spill response specialist level with an oil spill response organisation (OSRO) Participation in L2 oil spill exercise (initial) Participation in L2 oil spill exercise (refresher)
Operations, Planning, Logistics, Safety	• OSREC • CIMT Fundamentals Course (internal course) • Participation in L2 oil spill exercise (initial) Participation in L2 oil spill exercise (refresher)
Environment Coordinator	• CIMT Fundamentals • IMO2 or equivalent spill response specialist level with an OSRO • Participation in L2 oil spill exercise (initial) Participation in L2 oil spill exercise (refresher)
Note on competency/equivalency	
In 2018 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 Incident and Crisis Management training and the oil spill response training requirements for both CIMT and field-based roles. The revised CIMT Fundamentals training Program and Incident and Crisis Leaders Development Program (ICLDP) align with the performance requirements of the *PMAOMIR320 – Manage Incident Response Information* and *PMAOM0R418 - Coordinate Incident Response.* Regarding training specific equivalency; • ICLDP is mapped to *PMAOM0R418* (and which is equivalent to IMOIII when combined with Woodside's OSREC course) and ensures broader incident management principles aligned with Australasian Inter-service Incident Management System (AIIMS). • The revised CIMT Fundamentals Course is mapped to *PMAOMIR320* (and which is equivalent to IMOII). The blended learning program offers modules aligned to IMOIII, IMOII, IMOI and AMOSC Core Group Training Oil Spill Response Organisation Specialist Level training. • OSREC involves the completion of two (2) online AMSA Modules (Introduction to National Plan and Incident management; and Introduction to oil spills) as well as elements of IMOI and IMOII tailored to Woodside specific OSR capabilities. Woodside Learning Services (WLS) are responsible for collating and maintaining personnel training records. The HSP Dashboard reflects the competencies required for each oil spill role (IMT/operational).	

7.9.3 Emergency Response Preparation

The 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 an Emergency Response Plan (ERP) in place relevant to the Petroleum Activities Program. The ERP provides procedural guidance specific to the asset and location of operations to control, coordinate and respond to an emergency or incident. For a drilling 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).

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.

7.9.4 Oil and Other Hazardous Materials Spill

A significant hydrocarbon spill during the proposed Petroleum Activities Program is unlikely, but should such an event occur, it has the potential to result in a serious safety or environmental incident and cause asset and reputational damage if not managed properly. The Woodside Oil Pollution Emergency Arrangements (Australia) document, supported by the Oil Pollution First Strike Plan (**Appendix H**) which provides tactical response guidance to the activity/area and **Appendix D** this EP, cover spill response for this Petroleum Activities Program.

The Security and Emergency Management Function is responsible for managing Woodside's hydrocarbon spill response equipment and for maintaining oil 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 Woodside Oil Pollution Emergency Arrangements (Australia). AMSA and Woodside have a Memorandum of Understanding in place to support Woodside in the event of an oil spill.

The Oil Pollution First Strike Plan provides immediate actions required to commence a response (**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**.

7.9.5 Emergency and Spills Response

Woodside categorises incidents and emergencies in relation to response requirements as follows:

7.9.5.1 Level 1

Level 1 incidents are those that can be resolved using existing resources, equipment and personnel. A Level 1 incident is contained, controlled and resolved by site/regionally based teams using existing resources and functional support services.

7.9.5.2 Level 2

Level 2 incidents are characterised by a response that requires external operational support to manage the incident. It is triggered if the capabilities of the tactical level response are exceeded. This support is provided to the activity by activating all or part of the responsible CIMT.

7.9.5.3 Level 3

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.

7.9.6 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 7-10**. 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 7-10: Testing of response capability

Response Category	Scope	Response Testing Frequency	Response Testing Objective
Level 1 Response	Exercises are MODU/ vessel 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.	Comprehensive exercises test elements of the Oil Pollution First Strike Plan (**Appendix I**). Emergency drills are scheduled to test other aspects of the Emergency Response Plan.
Level 2 Response	Exercises are MODU specific	A minimum of one Emergency Management exercise per MODU per campaign [Note: must be conducted within one month of campaign commencing and at least one Level 2 exercise per 6 month hire period].	Testing both the facility IMT response and/or that of the CIMT following handover of incident control. Exercises may include testing of Source Control Response Strategies.
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

7.9.7 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. If the MODU leaves the field for an extended period, additional testing will be undertaken when it returns to routine operations. 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 7-10**, up to eight formal exercises are planned annually, across Woodside, to specifically test arrangements for responding to a hydrocarbon spill to the marine environment.

7.9.7.1 Testing of Arrangements Schedule

Woodside's Testing of Arrangements Schedule (**Figure 7-2**) aligns with international good practice for spill preparedness and response management; the testing is compatible with the IPIECA Good Practice Guide and the Australian Institute for Disaster Resilience (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.

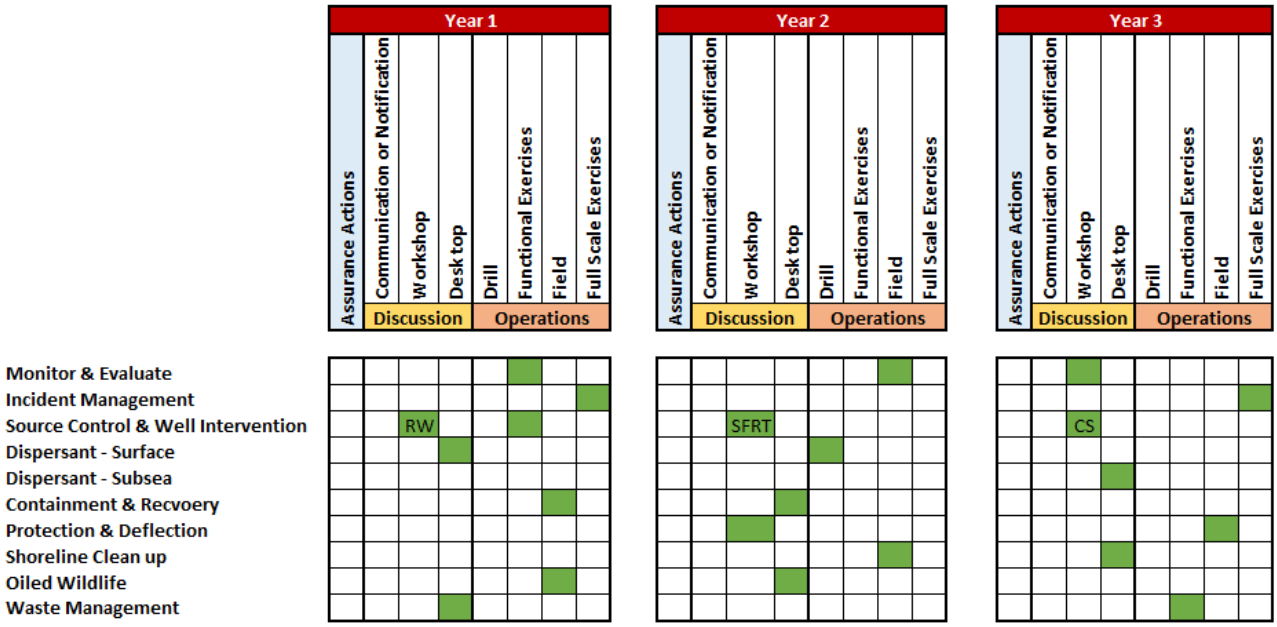


Figure 7-2: Indicative 3-yearly testing of arrangements schedule

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 3-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).

7.9.8 Cyclone and Dangerous Weather Preparation

As the timing of some activities associated with the Petroleum Activities Program are not yet determined, it is possible drilling and subsea activities will overlap with the cyclone season (November to April, with most cyclones occurring between January and March). If drilling in cyclone season, the MODU contractor and vessel contractors must have a Cyclone Contingency Plan (CCP) in place outlining the processes and procedures that would be implemented during a cyclone event, which will be reviewed and accepted by Woodside.

The MODU and project vessels will receive daily forecasts from the Bureau of Meteorology. If a cyclone (or severe weather event) is forecast, the path and its development will be 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 CCP will be actioned. If required, vessels can transit from the proposed track of the cyclone (severe weather event).

8 REFERENCES

[AMSA] Australian Maritime Safety Authority, 2013. The Effects of Maritime Oil Spills on Wildlife including Non-avian Marine Life. Australian Maritime Safety Authority, Canberra, ACT.

[ATSB] Australian Transport Safety Bureau, 2011. ATSB Annual Report 2010-2011. Commonwealth of Australia 2011.

[BoM] Bureau of Meteorology, 2012. Monthly Rainfall – Karratha Aero. Bureau of Meteorology, Canberra, ACT. Available at http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=004083. Accessed 19-Jun-2012.

[DAWE] Department of Agriculatrue, Water and the Environment, 2021. Species Profile and Threats Database – Key Ecological Features. Commonwealth of Australia, Canberra.

[DBCA] Department of Biodiversity, Conservation and Attractions, 2021. Houtman Abrolhos Islands National Park draft management plan, 2021. Department of Biodiversity, Conservation and Attractions, Perth.

[DBCA] Department of Biodiversity, Conservation and Attraction, 2022. Exmouth. *Explore Parks WA*. Government of Western Australia. Available at: https://exploreparks.dbca.wa.gov.au/tourism-region/Exmouth

[DCCEEW] Department of Climate Change, Energy, Environment and Water, 2022. Australasian Underwater Cultural Heritage Database. Commonwealth of Australia.

[DCCEEW] Department of Climate Change, Energy, Environment and Water, n.d.(a). Ancient Coastline at 125m depth contour. *Species Profile and Threats Database.* Commonwealth of Australia. Available at: https://www.environment.gov.au/sprat-public/action/kef/view/9

DCCEEW] Department of Climate Change, Energy, Environment and Water, n.d.(b). Continental Slope Demersal Fish Communities. *Species Profile and Threats Database.* Commonwealth of Australia. Available at: https://www.environment.gov.au/sprat-public/action/kef/view/79;jsessionid=01AD87551D0DE1B0248C8722BE137004

[DEWHA] Department of the 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. Australian Government.

[DEWHA] Department of the Environment, Water, Heritage and the Arts, 2009. Threat abatement plan for the impacts of marine debris on vertebrate marine life. Department of the Environment, Water, Heritage and the Arts, Canberra

[DHNRDT] 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.

[DoE] Department of Environment, 2015. Wildlife Conservation Plan for Migratory Shorebirds. Commonwealth of Australia, 2015.

[DoEE] Department of Environment and Energy, 2016. Draft national strategy for mitigating vessel strike of marine megafauna. Department of the Environment and Energy, Canberra.

[DoEE] Department of the Environment and Energy, 2018.Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans.

[DoF] Department of Fisheries, 2011a. Fisheries Fact sheet: Seagrasses, Western Australia. Available at http://www.fish.wa.gov.au/Documents/

[DoF] Department of Fisheries, 2011b. State of the Fisheries and Aquatic Resources Report 2010/11. Fletcher, W.J. and Santoro, K. (eds), Department of Fisheries, Perth, Western Australia.

[DPIRD] Department of Primary Industries and Regional Development, 2022. West Coast Demersal Scalefish Resource Harvest Strategy 2021-2025 Version 1.0. Fisheries Management Paper No. 305. Department of Primary Industries and Regional Development, Perth, Western Australia. 50p.

[DSEWPaC] Department of Sustainability, Environment, Water, Population and Communities, 2011. Approved Conservation Advice for *Aipysurus apraefrontalis* (Short-nosed Sea Snake). Department of Sustainability, Environment, Water, Population and Communities, Canberra.

[IOGP] 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.

[IPIECA] International Petroleum Industry Environmental Conservation Association, 2004. A Guide to Oiled Wildlife Response Planning. International Petroleum Industry Conservation Association Report Series, no. 13.

[ITOPF] International Tanker Owners Pollution Federation, 2011a. Effects of oil pollution on the marine environment. Technical Paper 13. International Tanker Owners Pollution Federation Limited, London, United Kingdom.

[ITOPF] International Tanker Owners Pollution Federation, 2011b. Effects of oil pollution on fisheries and mariculture. Technical Paper 11. International Tanker Owners Pollution Federation Limited, London, United Kingdom.

[MPRA] Marine Parks and Reserves Authority, 2005. Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005–2015. Marine Parks and Reserves Authority, Perth, Western Australia.

[MPRA] Marine Parks and Reserves Authority, 2007. Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves, Marine Parks and Reserves Authority, Perth, Western Australia.

[NERA] National Energy Resources Australia (2018). Environment Plan Reference Case – Consequence analysis of an accidental release of diesel. Available at: https://referencecases.nera.org.au/

[NMFS] 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.>.

[NMFS] 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.

[NOAA] National Oceanic and Atmospheric Administration, 2010. Oil and Sea Turtles: Biology, Planning and Response. National Oceanic and Atmospheric Administration, Washington.

[NOAA] National Oceanic and Atmospheric Administration, 2014. Oil spills in mangroves: Planning & response considerations. National Oceanic and Atmospheric Administration, Washington.

[NOAA] 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.

[NOPSEMA] National Offshore Petroleum Safety and Environmental Management Authority, 2015. NOPSEMA briefing and MODU mooring systems in cyclonic conditions briefing. https://www.nopsema.gov.au/assets/Presentations/Presentation-NOPSEMA-briefing-and-MODU-mooring-systems-in-cyclonic-conditions-Sept–2015.pdf.

[NOPSEMA] National Offshore Petroleum Safety and Environmental Management Authority, 2019. Oil Spill Modelling Guidance Bulletin. https://www.nopsema.gov.au/resources/regulatory-bulletin

[NRC] National Research Council., 2005. Oil Spill Dispersant: Efficacy and Effects. National Academies Press. ISBN 978-0309095624

[PENV] Pendoley Environmental, 2020. Scarborough Desktop Lighting Impact Assessment. Prepared by Pendoley Environmental Pty Ltd for Advisian, February 2020. Appendix K of the Scarborough Offshore Project Proposal (OPP).

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., Garriso, L., Martinez, A., Barry, K., Speakman, T., 2017. Exposure of cetaceans to petroleum products following the Deepwater Horizon oil spill in the Gulf of Mexico. Endangered Species Research 33: 119-125.

Apache, 2013. Coniston Novara Phase 2 Drilling EP Summary. Apache Energy. Perth, Australia.

Azis, P. A., Al-Tisan, I. A., Daili, M. A., Green, T. N., Dalvi, A. G. I., & Javeed, M. A., 2003. Chlorophyll and plankton of the Gulf coastal waters of Saudi Arabia bordering a desalination plant. Desalination, 154(3), 291-302.

Baker, C., Potter, A., Tran, M. and Heap, A.D., 2008. Sedimentology and Geomorphology of the North West Marine Region of Australia, Geoscience Australia Record 2008/07, Geoscience Australia, Canberra, Australian Capital Territory.

Balcom, B. J., Graham, B. D., Hart, A. D., & Bestall, G. P., 2012. Benthic Impacts Resulting from the Discharge of Drill Cuttings and Adhering Synthetic Based Drilling Fluid in Deepwater. In International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production. OnePetro.

Batten, S.D., Allen, R.J.S., Wotton, C.O.M., 1998. The effects of the Sea Empress oil spill on the plankton of the Southern Irish Sea. Marine Pollution Bulletin 36(10): 764-774.

BHP Billiton, 2004. Stybarrow Development Draft EIS. BHP Billiton, Perth, Australia.

Black, K.P., Brand, G.W., Grynberg, H., Gwyther, D., Hammond, L.S., Mourtikas, S., Richardson, B.J. and Wardrop, J.A. 1994. Production facilities. In: Environmental implications of offshore oil and gas

BMT Oceanica, 2016. Offshore canyons of Western Australia: Cape Range Canyon literature review and Enfield Canyon 2015 environment survey (Report No. 1247_003/2 Rev 1). BMT Oceanica Pty Ltd, Perth.

Bonn Agreement, 2015. Bonn Agreement Counter Pollution Manual, December 2015. Ed. Bonn Agreement Secretariat, London.

BP Azerbaijan, 2013. Drilling and Completion Environmental Impact Assessment, Mitigation and Monitoring. BP Development Pty Ltd. https://www.bp.com/content/dam/bp/country-sites/en_az/azerbaijan/home/pdfs/esias/sd/sd2/9_drilling_eia.pdf

Brewer, D.T., Lyne, V., Skewes, T.D., Rothlisberg, P. 2007. Trophic Systems of the North West Marine Region. A Report to The Department of the Environment, Water, Heritage and the Arts, by CSIRO Marine and Atmospheric Research: pp156.

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/wedgetailed%20shearwater%20foraging%20behaviour.pdf

Catry, T., Ramos, J.A., Le Corre, M., Phillips, R.A., 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.

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.

Cianchetti-Benedetti M., Becciu, P., Massa, B., Dell'Omo, G., 2018. Conflicts between tourist recreational activities and breeding shearwaters: short-term effect of artificial light and sound on chick weight. European Journal of Wildlife Research, 64, doi:10.1007/s10344-018-1178- x.

Cohen, A., Gagnon, M.M., Nugegoda, D., 2005. Alterations of metabolic enzymes in Australian bass, Macquaria novemaculeata, after exposure to petroleum hydrocarbons. Archives of Environmental Contamination and Toxicology 49:200–205.

Commonwealth of Australia, 2013. Recovery Plan for the Australian Sea Lion (*Neophoca cinerea).* Commonwealth of Australia, 2013.

Commonwealth of Australia, 2014. Recovery Plan for the Grey Nurse Shark (Carcharias taurus) 2014. Commonwealth of Australia, 2014.

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 Sharks Multispecies Recovery Plan. Commonwealth of Australia 2015.

Commonwealth of Australia, 2017. The Recovery Plan for Marine Turtles in Australia. Department of the Environment and Energy. Canberra, Australia. 146 p.

Commonwealth of Australia, 2018. Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018). Commonwealth of Australia, 2018.

Commonwealth of Australia, 2020. National Light Pollution Guidelines for Wildlife, Including marine turtles, seabirds and migratory shorebirds. Light Pollution Guidelines. Department of the Environment and Energy, Canberra.

Connell, S.C., Koessler, M.W., and McPherson, C.R., 2021. *BMG Wells Plug and Abandonment Activities: Acoustic Modelling for Assessing Marine Fauna Sound Exposures*. Document 02381, Version 1.0. Technical report by JASCO Applied Sciences for Cooper Energy Limited.

Cordes, E. E., Jones, D. O., Schlacher, T. A., Amon, D. J., Bernardino, A. F., Brooke, S., ... & Witte, U., 2016. Environmental impacts of the deep-water oil and gas industry: a review to guide management strategies. *Frontiers in Environmental Science*, *4*, 58.

Crecelius, E., Trefry, J., McKinley, J., Lasorsa, B., Trocine, R., 2007. Study of barite solubility and the release of trace components to the marine environment (OCS Study No. MMS 2007-061). United States Department of the Interior, New Orleans.

Dall, W., Hill, B.J., Rothlisberg, P.C., Sharples, D.J., 1990. The biology of the Penaeidae. Advances in Marine Biology 27: 170pp

Det Norske Veritas, 2011. Assessment of the risk of pollution from marine oil spills in Australian ports and waters (Report No. PP002916). Det Norske Veritas Ltd, London.

Diercks, A-R., Highsmith, R.C., Asper, V.L., Joung, D., Zhou, Z., Guo, L., Shiller, A.M., Joye, S.B., Teske, A.P., Guinasso, N., Wade, T.L., Lohrenz, S.E., 2010. Characterization of subsurface polycyclic hydrocarbons at the Deepwater Horizon site. Geophysical Research Letters 37(20): L20602, doi:10.1029/201GL045046

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. C., Andrews-Goff, V., Jenner, K. C. S., Jenner, M. N., Laverick, S. M., Branch, T. A., andd Gales, N. J., 2014. Migratory movements of pygmy blue whales (Balaenoptera musculus brevicauda) between Australia and Indonesia as revealed by satellite telemetry. *PLoS One*, *9*(4), e93578.

Erbe, C., 2012. Effects of underwater noise on marine mammals. Advances in Experimental Medicine and Biology. 730:pp. 17-23.

Erbe, C. and McPherson, C. 2017. Underwater noise from geotechnical drilling and standard penetration testing. Journal of the Acoustical Society of America, 142 (3), September 2017.

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.

Fairweather Science, 2018. Petition for incidental take regulations for oil and gas activities in Cook Inlet, Alaska; Alaska Hilcorp Alaska, Harvest Alaska, & Alaska Gasline Development Corporation, May 3, 2018; https://www.fws.gov/r7/fisheries/mmm/pdf/ITR_Application.pdf

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.J. and Santoro, K. (eds), 2012. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2011/12: The State of the Fisheries. Department of Fisheries, Western Australia.

Fodrie, F.J., Heck Jr., K. L., 2011. Response of coastal fishes to the Gulf of Mexico oil disaster. PLoSONE 6(7): e21609. https://doi.org/10.1371/journal.pone.0021609.

French, D.P., Schuttenberg, H.Z., Isaji, T., 1999. Probabilities of oil exceeding thresholds of concern: examples from an evaluation for Florida Power and Light. Presented at the Arctic and Marine Oilspill Program Technical Seminar, Ministry of Supply and Services, Ottawa, pp. 243–270.

French-McCay, D., 2002. Development and application of oil toxicity and exposure model, OILTOXEX. Environmental Toxicology and Chemistry 21: 2080-2094.

French-McCay, D., 2009. State-of-the-art and research needs for oil spill impact assessment modelling, in: Proceedings of the 32nd AMOP Technical Seminar on Environmental Contamination and Response. Presented at the 32nd AMOP Technical Seminar on Environmental Contamination and Response, Environment Canada, Ottawa, pp. 601–653.

French-McCay, D. P., Horn, M., Li, Z., Jayko, K., Spaulding, M. L., Crowley, D., & Mendelsohn, D., 2018. Modeling distribution, fate, and concentrations of Deepwater Horizon oil in subsurface waters of the Gulf of Mexico. In Oil Spill Environmental Forensics Case Studies (pp. 683-735). Butterworth-Heinemann.

Frick W.E., Roberts, P.J.W., Davis, L.R., Keyes, J., Baumgartner, D.J., George, K.P., 2001. Dilution Models for Effluent Discharges, 4th Edition (Visual Plumes) Draft. US Environmental Protection Agency, Georgia. July 2001.

Gagnon, M.M., & Rawson, C., 2010. Montara well release: Report on necropsies from birds collected in the Timor Sea. Curtin University. Perth, Western Australia. 20pp.

Gascoyne Development Commission, 2012. Economic Development Opportunities for the Gascoyne Region associated with the Resource Sector Investment and Expansion. Gascoyne Pilbara Project, January 2012. SGS Economics and Planning, pp. 95.

Gaston, K. J., Gaston, S., Bennie, J., & Hopkins, J., 2014. Reducing the impacts of artificial light. British Wildlife, 25(5), 332-339.

Geraci, J.R., 1988. Physiological and toxicology effects on cetaceans. In: Synthesis of effects of oil on marine mammals, Chapter 5. J.R. Geraci and D.J. St. Aubin, eds. OCS Study MMS 88-0049 prepared by Battelle Memorial Institute for USDOI, MMS, Atlantic OCS region, under contract no. 14-120001-30293.

Gilmour, J.P., Smith, L.D., Heyward, A.J., Baird, A.H., Pratchett, M.S., 2013. Recovery of an isolated coral reef system following severe disturbance. Science 340: 69-71.

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.

Grooms, C.H., Koessler, M and McPherson, C. 2019. *Julimar High Resolution 2-D Survey: Acoustic Modelling for Assessing Marine Fauna Sound Exposures.* Document 01969, Version 1.0 DRAFT. Technical report by JASCO Applied Sciences for Woodside Energy Limited.

Hamann, M., Limpus, C., Hughes, G., Mortimer, J., & Pilcher, N., 2006. Assessment of the conservation status of the leatherback turtle in the Indian Ocean and South East Asia, including consideration of the impacts of the December 2004 tsunami on turtles and turtle habitats. IOSEA Marine Turtle MoU Secretariat, Bangkok.

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 54: 902–924.

Harasti, D., Lee, K.A., Gallen, C., Hughes, J.M. and Stewart, J. 2015. Movements, home range and site fidelity of snapper (Chrysophrys auratus) within a temperate marine protected area. PLoS ONE 10(11): e0142454.

Hart, A., Murphy, D & 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.U., Javed, H.I., 2011. Effects of Tasman Spirit oil spill on coastal birds at Clifton, Karachi Coast, Pakistan. The Journal of Animal and Plant Sciences, 21(2 Suppl.): 333-339.

Hazel, J., Lawler, I.R., Marsh, H., Robson, S., 2007. Vessel speed increases collision risk for the green turtle Chelonia mydas. Endangered Species Research 3, 105–113.

Heatwole, H., Cogger, H.G., 1993. Family Hydrophiidae. In: Glasby, C.G., Ross, G.J.B., Beesley, P.L. (Eds.), Fauna of Australia. AGPS Canberra, vol. 2A (36), p. 20.

Helm, R.C, Costa, D.P, DeBruyn, T.D, O'Shea, T.J, Wells, R.S, Williams, T.M., 2015. Overview of effects of oil spills on marine mammals. In: Fingas M (Ed.) Handbook of oil spill science and technology, 1st edn. John Wiley & Sons, Hoboken, NJ, p 455−475.

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., Stovrik, G., Stenseth, N.C., 2007. Fish and oil in the Lofoten-Barents Sea system: synoptic review of the effect of oil spills on fish populations. Marine Ecology Progress Series 339: 283- 299.

Holloway, P.E., 1983. Tides on the Australian north-west shelf, Australian Journal of Marine and Freshwater Research 34: 213–230.

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)

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.

Jarman, S., Wilson, S., 2004. DNA-based species identification of krill consumed by whale sharks. Journal of Fish Biology 65: 586–591.

Jenkins, G., and McKinnon, L., 2006, Port Phillip Bay Channel Deepening Project: supplemental environmental effects statement – aquaculture and fisheries

Jensen, A., Silber, G., 2004. Large whale ship strike database (NOAA Technical Memorandum No. NMFS-OPR). National Marine Fisheries Service, Silver Spring.

Jiménez-Arranz, G., Glanfield, R., Banda, N. 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.M., Rummer, J.L., Esbaugh, A.J., 2017. Oil exposure disrupts early life-history stages of coral reef fishes via behavioural impairments. Nature Ecology & Evolution, 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.

Kangas, M., Wilkin, S., Koefoed, I., & Brown, S., 2021. Exmouth Gulf Prawn 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. 108-115.

King, D., Lyne, R., Girling, A., Peterson, D., Stephenson, R., Short, D., 1996. Environmental risk assessment of petroleum substances: The hydrocarbon block method (CONCAWE No. 96/52). CONCAWE, Brussels.

Koops, W., Jak, R., van der Veen, D., 2004. Use of dispersants in oil spill response to minimize environmental damage to birds and aquatic organisms. Interspill 2004.

Ladich, F. 2000. Acoustic communication and the evolution of hearing in fishes. Philosophical Transactions of the Royal Society of London B 355(1401): 1285-1288.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S., Podesta, M., 2001. Collisions between ships and whales. Marine Mammal Science 17, 35–75.

Le Provost, Dames and Moore, 2000. Ningaloo Marine Park (Commonwealth Waters), Literature Review. Prepared for Environment Australia, Le Provost, Dames and Moore, Perth, Western Australia.

Li, Z., Spaulding, M.L., French-McCay, D., 2017, 'An algorithm for modelling entrainment and naturally and chemically dispersed oil droplet size distribution under surface breaking wave conditions', Marine Pollution Bulletin, vol. 119, no. 1, pp145–152.

Limpus C.J., 2009. A biological review of Australian marine turtles. Environmental Protection Agency, Brisbane.Limpus, C. J., & McLachlan, C., 1979. Observations on the leatherback turtle, Dermochelys coriacea (L.), in Australia. Wildlife Research, 6(1), 105-116.

Limpus, C. J., McCachlan, N. C., & Miller, J. D., 1984. Further observations on breeding of Dermochelys coriacea in Australia. Wildlife Research, 11(3), 567-571.

Longcore, T., & Rich, C., 2004. Ecological light pollution. Frontiers in Ecology and the Environment, 2(4), 191-198.

Lui, Z., Liu, J., Zhu, Q., Wu, W., 2012. The weathering of oil after the Deepwater Horizon oil spill: insights from the chemical composition of the oil from the sea surface, salt marshes and sediments. Environmental Research Letters 7: 035302, doi:10.1088/1748-9326/7/3/035302

Lutcavage, M.E, Lutz, P.L, Bossart, G.D., Hudson, D.M., 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology 28:417–422.

MacGillivray, A.O., Racca, R and Li, Z. 2013. Marine mammal audibility of selected shallow-water survey sources. Journal of the Acoustical Societyof America, 135 (1), January 2014.

Martin, S.B., K.A., Kowarski, E.E. Maxner, and C.C. Wilson. 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.

Masel, J.M., Smallwood, D.G., 2000. Habitat usage by postlarval and juvenile prawns in Moreton Bay, Queensland, Australia. The Proceedings of the Royal Society of Queensland 109: 107- 117.

Matkin, C.O., E.L. Saulitis, G.M. Ellis, P. Olesiuk, 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. http://dx.doi.org/10.3354/meps07273.

McCauley, R., 1998. Radiated underwater noise measured from the drilling rig Ocean General, rig tenders Pacific Ariki and Pacific Frontier, fishing vessel Reef Venture and natural sources in the Timor Sea, Northern Australia. (Report No. C98–20). Centre for Marine Science and Technology, Curtin University of Technology, Perth.

McCauley, R D.,2004. Underwater Sea Noise in the Otway Basin – Drilling, Seismic and Blue Whales. Report prepared by Centre for Marine Science and Technology, Curtin University, for Santos Ltd. As cited in Santos Ltd Offshore Drilling Campaign – WA – 26 – L and WA – 191 – P (Carnarvon Basin) EPBC Referral.

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.D., Fewtrell, F., Duncan, A.J., Jenner, C., Jenner, M-N, Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K. 2000. Marine seismic surveys – a study of environmental implications. The APPEA Journal 40(1): 692-706

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

McIntyre, A.D & Johnston, R., 1975. Effects of Nutrient Enrichment from Sewage in the Sea, in: Discharge of Sewage from Sea Outfalls: Proceedings of an International Symposium Held at Church House, London, 27 August to 2 September 1974. Elsevier.

McKenna M.F., Calambokidis, J., Oleson, E.M., Laist, D.W., and Goldbogen, J.A., 2015. Simultaneous tracking of Blue whales and large ships demonstrates limited behavioural responses for avoiding collision. Endangered Species Research 27: 219-232.

McLean, D.L., Partridge, J.C., Bond, T., Birt, M.J., Bornt, K.R., Langlois, T.J., 2017. Using industry ROV videos to assess fish associations with subsea pipelines. Continental Shelf Research 141, 76–97. doi:10.1016/j.csr. 2017.05.006

McPherson, C. and Wood, M. 2017. Otway Basin Geophysical Operations Acoustic Modelling - Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Prepared for Lattice Energy on 2 November 2017. Document 01473

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.

Miller, R. G., Hutchison, Z. L., Macleod, A. K., Burrows, M. T., Cook, E. J., Last, K. S., & Wilson, B., 2013. Marine renewable energy development: assessing the Benthic Footprint at multiple scales. *Frontiers in Ecology and the Environment*, *11*(8), 433-440.

Milton, S.L., Lutz, P.L., 2003. Physiological and genetic responses to environmental stress, in: Lutz, P.L., Musick, J.A., Wyneken, J. (Eds.), The Biology of Sea Turtles. CRC Press, Boca Raton, pp. 164–198.

Mitkus, M., Nevitt, G.A., Kelber, A., 2018. Development of the Visual System in a Burrow-Nesting Seabird: Leach's Storm Petrel. Brain Behaviour Evolution 91: 4–16.

Moran, M., Burton, C. and Jenke, J. 2004. Long-term movement patterns of continental shelf and inner gulf snapper (Pagrus auratus, Sparidae) from tagging in the Shark Bay region of Western Australia. Marine and Freshwater Research 54 (8): 913–922.

National Oceanic and Atmospheric Administration, 1996. Aerial observations of oil at sea (HAZMAT Report No. 96–7). National Oceanic and Atmospheric Administration, Seattle.

National Research Council, 2005. Oil spill dispersants: efficacy and effects. The National Academies Press, Washington, D.C.

Nedwed, T., Smith, J.P., Melton, R., 2006. Fate of nonaqueous drilling fluid cuttings discharged from a deepwater exploration well. Presented at the SPE International Health, Safety and Environment Conference, Society of Petroleum Engineers, Abu Dhabi.

Neff, J., McKelvie, S., Ayers Jr., R., 2000. Environmental impacts of synthetic based drilling fluids (OCS Study No. MMS 2000-064). United States Department of the Interior, New Orleans.

Neff, J.M., 2005. Composition, environmental fates, and biological 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., Heyward, A.J., 2000. Inhibition of fertilization and larval metamorphosis of the coral Acropora millepora (Ehrenberg, 1834) by petroleum products. Marine Pollution Bulletin 41(7- 12): 420-427.

Neptune Geomatics, 2010. Julimar Development Route Survey Report. Prepared for Apache Energy Ltd by Neptune Geomatics, Perth, Western Australia.

NERA, 2018. Environment Plan Reference Case: Anchoring of Vessels and Floating Facilities. National Resources Energy Australia, Perth, Western Australia.

Newell, R. C., Seiderer, L. J., & Hitchcock, D. R., 1998. The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Oceanography and Marine Biology: an annual review, 36(1), 127-178.

Newman S.J., Smith K.A., Skepper C.L. and Stephenson P.C. 2008. Northern Demersal Scalefish Managed Fishery. ESD Report Series No. 6, June 2008. Department of Fisheries, Perth, Western Australia.

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.

Offshore: Risk and Technology Consulting Inc., 2002. Post mortem failure assessment on MODUs during Hurricae Lili (MMS Order No. 0103PO72450). Minerals Management Service, Houston.

OSPAR Commission 2021. OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR) – Update 2021. Agreement 2013-06. 9pp

Ovenden, J.R., Salini, J., O'Connor, S. and Street, A.R. 2004. Pronounced genetic population structure in a potentially vagile fish species (*Pristipomoides multidens*, Teleostei; Perciformes; Lutjanidae) from the East Indies triangle. Molecular Ecology 13(7): 1991–1999.

Owens, E.H., Humphrey, B., Sergy, G.A., 1994. Natural cleaning of oiled coarse sediment shorelines in Arctic and Atlantic Canada. Spill Science and Technology Bulletin 1, 37–52.

Oxford Economics, 2010. Potential Impact of the Gulf Oil Spill on Tourism. Report prepared for the U.S. Travel Association.

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

Parsons, D.M., Morrison, M.A., McKenzie, J.R., Hartill, B.W., Bian, R. and Francis, R.C. 2011. A fisheries perspective of behavioural variability: differences in movement behaviour and extraction rate of an exploited sparid, snapper (Pagrus auratus). Canadian Journal of Fisheries and Aquatic Sciences 68(4): 632–42

Patterson, H., Bromhead, D., Galeano, D., Larcombe, J., Woodhams, J., and Curtotti, R. 2021. Fishery status reports 2021, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0. https://doi.org/10.25814/vahf-ng93.

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, Museum of Western Australia, Perth, Western Australia.

Pendoley, K., Whittock P.A., Vitenbergs A., & Bell, C., 2016. Twenty years of turtle tracks: marine turtle nesting activity at remote locations in the Pilbara, Western Australia. Australian Journal of Zoology, 64: 217–226.

Petroleumstilsynet, 2014. Anchor line failures Norwegian continental shelf 2010–2014 (Report No. 992081). Petroleumstilsynet, Stavanger.

Popper, A.N. and Hawkins, A.D. 2018. The importance of particle motion to fishes and invertebrates. Journal of the Acoustical Society of America 143 (1): 470-488.

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.

Popper, A.N., Hawkins, A.D., Sand, O. and Sisneros, J.A. 2019. Examining the hearing abilities of fishes. Journal of the Acoustical Society of America, 146(2): 948-955.

Rainer, S.F., 1991. High species diversity in demersal polychaetes of the north west shelf of Australia. Ophelia, Suppl. 5: 497-505.

Rich, C. & Longcore T. 2006. Ecological consequences of artificial night lighting. Island Press.

Richardson, W.J., Fraker, M.A., Würsig, B. and Wells, R.S. 1985. Behaviour of bowhead whales Balaena mysticetus summering in the Beaufort Sea: Reactions to industrial activities. *Biol. Conserv.*, 32: 195–230.

Richardson, W.J., Greene Jr, C.R., Malme, C.I., Thomson, D.H., 1995. Marine Mammals and Noise. Academic Press, San Diego.

Rodríguez, A., Holmes, N.D., Ryan, P.G., Wilson, K-J., Faulquier, L., Murillo, Y., Raine, A.F., Penniman, J.F., Neves, V., Rodríguez, B., Negro, J.J., Chiaradia, A., Dann, P., Anderson, T., Metzger, B., Shirai, M., Deppe, L., Wheeler, J., Hodum, P., Gouveia, C., Carmo, V., Carreira, G.P., Delgado-Alburqueque, L., Guerra-Correa, C., Couzi, F-X., Travers, M., Corre, M.L., 2017. Seabird mortality induced by land-based artificial lights. Conservation Biology 31: 986– 1001.

Rolland, R.M., Parks, S.E., Hunt, K.E., Castellote, M., Corkeron, P.J., Nowacek, D.P., Wasser, S.K., 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., Hollander, D.J., 2015. Hydrocarbons in deep-sea sediments following the 2010 deepwater horizon blowout in the Northeast Gulf of Mexico. PLoSONR 10(5): e0128371. https://doi.org/10.1371/journal.pone.0128371

Rönnbäck, P., Macia, A., Almqvist, G., Schultz, L., Troell, M., 2002. Do penaeid shrimps have a preference for mangrove habitats? Distribution pattern analysis on Inhaca Island, Mozambique. Estuarine, Coastal and Shelf Science 55, 427–436.

Rosser, N. and Gilmour, J., 2008. New insights into patterns of coral spawning on Western Australian reefs. Coral Reefs 27, 345–349.

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), 2011a. Pipeline Corridor Biological Seabed Survey: Apache Julimar Development Project – Field Report. Prepared for Apache Energy Limited, October 2011. Perth, Western Australia.

RPS Group (RPS), 2011b. Apache Biological Seabed Survey: Balnaves Development Project – Field Report. Prepared for Apache Energy Limited, October 2011. Perth, Western Australia.

RPS 2019. WEL Scarborough development Quantitative Spill Risk Assessment - Preliminary Results. Prepared for Advisian on behalf of Woodside Energy Ltd. RPS Group

Runcie, J., Macinnis-Ng, C., Ralph, P., 2010. The toxic effects of petrochemicals on seagrassess - literature review. Institute for Water and Environmental Resource Management, University of Technology Sydney, Sydney.

Salgado Kent, C., McCauley, R.D., Duncan, A., Erbe, C., Gavrilov, A., Lucke, K. 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, Curtin University, Perth, WA.

Salmon, M., Reiners, R., Lavin, C., Wyneken, J., 1995a. Behavior of loggerhead sea turtles on an urban beach. I. Correlates of nest placement. Journal of Herpetology 560–567.

Salmon, M., Tolbert, M.G., Painter, D.P., Goff, M., Reiners, R., 1995b. Behavior of loggerhead sea turtles on an urban beach. II. Hatchling orientation. Journal of Herpetology 568–576.

Salmon, M., Witherington, B.E., 1995. Artificial lighting and seafinding by loggerhead hatchlings: evidence for lunar modulation. Copeia 931–938.

Salmon, M., Wyneken, J., Fritz, E., Lucas, M., 1992. Seafinding by hatchling sea turtles: role of brightness, silhouette and beach slope as orientation cues. Behaviour 122:56-77.

Sanderfoot, V., & Holloway, T., 2017 Air Pollution impacts on avian species via inhalation exposure and associated outcomes. Environmental Research Letters 12: 8.

Shell, 2010. Prelude Floating LNG Project, Environmental Impact Statement (EPBC No. 2008/4146) Shell Development (Australia) Pty Ltd.

Simmonds, M., Dolman, S., Weilgart, L., 2004. Oceans of noise, WDCS Science Report. Whale and Dolphin Conservation Society, Chippenham.

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.

SKM, 2006. Marine Survey for Proposed Angel Pipeline Route, Prepared for Woodside Energy Ltd by Sinclair Knight Merz Pty Limited, Perth, Western Australia.

Smallwood, C.B., Beckley, L.E., Moore, S.A., Kobryn, H.T., 2011. Assessing patterns of recreational use in large marine parks: A case study from Ningaloo Marine Park, Australia. Ocean & Coastal Management, 54 (4). pp. 330-341.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, Jr., C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L., 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33:411–521.

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

Spaulding, M.L., Li, Z., Mendelsohn, D., Crowley, D., French-McCay, D., Bird, A., 2017. ‘Application of an integrated blowout model system, OILMAP DEEP, to the Deepwater Horizon (DWH) Spill’, Marine Pollution Bulletin, vol. 120, no. 1-2, pp. 37–50.

Sporer, E., Kangas, M., Shanks, M., and Pickles, L., 2012. North coast prawn managed fisheries status report. In: Status report of the fisheries 2011/2012. Department of Fisheries.

Strain L, Hart A and Jones R. 2021. Western Australian Abalone Managed Fishery. Western Australian Marine Stewardship Council Report Series No. 8. Addendum 4. Department of Primary Industries and Regional Development, Western Australia. 28p.

Stroot, D.H., M.W. Koessler, and C.R. McPherson, 2023.Woodside NWS MODU Drilling Operations: Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Document 02913, Version 1.0. Technical report by JASCO Applied Sciences for Woodside Energy Limited.

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.

Taylor, J.G., Pearce, A.F., 1999. Ningaloo Reef currents: implications for coral spawn dispersal, zooplankton and whale shark abundance. Journal of the Royal Society of Western Australia 82(2): 57-65.

Telfer, T.C., Sincock, J. L., Byrd, G.V., Reed, J.R., 1987. Attraction of Hawaiian seabirds to lights: conservation efforts and effects of moon phase. Wildlife Society Bulletin 15: 406–413.

Terrens, G.W., Gwyther, D., Keough, M.J., Tait, R.D., 1998. Environmental Assessment of Synthetic-Based Drilling-Mud Discharges to Bass Strait, Australia. Presented at the International Conference on Health, Safety, and Environment in Oil and Gas Exploration and Production, Society of Petroleum Engineers, Caracas, p. SPE-46622-MS. Doi:10.2118/46622-MS.

Thornhill, D.J., Struck, T.H., Ebbe, B., Lee, R.W., Mendoza, G.F., Levin, L.A., Halanych, K.M., 2012. Adaptive radiation in extremophilic Dorvilleidae (Annelida): diversification of a single colonizer or multiple independent lineages? Ecology and Evolution 2(8): pp1958–1970.

Thums, M. & Ferreira, L.C. 2021. Informing spatial management for pygmy blue whale management: fine scale analysis of movement. Australian Institute of Marine Science, Confidential Report to Woodside Energy Ltd. Final Rev 0, October 2021. 19 pp.

Thums, M., Ferreira, L. C., Jenner, C., Jenner, M., Harris, D., Davenport, A., ... & McCauley, R., 2022a. Pygmy blue whale movement, distribution and important areas in the Eastern Indian Ocean. *Global Ecology and Conservation*, *35*, e02054.

Thums, M., Ferreira, L. C., Davenport, A., Jenner, C and Jenner, M. 2022b. Use of satellite linked archival tags to characterise and track pygmy blue whale diving behaviour. Report prepared for Woodside Energy Ltd. By the Australian Institute of Marine Science, Perth (30pp), Rev 0.

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(2): 222-233.

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.

Vanderlaan, A.S.M., Taggart, C.T., 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. Marine Mammal Science 23, 144–156. Doi:10.1111/j.1748-7692.2006.00098.x.

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

White, H.K., Hsing,P-Y., Cho, W., Shank, T.M., Cordes, E.E., Quattrini, A.M., Nelson, R.K., Camilli, R., Demopoulos, A.W.J., German, C.R., Brooks, J.M., Roberts, H.H., Shedd, W., Reddy, C.M., Fisher, C.R., 2012. Impact of the Deepwater Horizon oil spill in a deep-water coral community in the Gulf of Mexico. Proceedings of the National Academy of Sciences of the United States of America 109(50): 20303-20308.

Whiting, A.U., 2018. Analyses of turtle track count data from Rosemary Island, Dampier Archipelago: 1990 to 2017. Unpublished report to the Parks and Wildlife Service, Department of Biodiversity, Conservation and Attractions, Pilbara Region

Whittock, P.A., Pendoley, K.L., Hamann, M., 2016a. Using habitat suitability models in an industrial setting: the case for internesting flatback turtles. Ecosphere 7(11): e01551. Balnaves Plug and Abandonment (WA-49-L) Environment Plan

Whittock, P.A., Pendoley, K.L., Hamann, M., 2016b. Flexible foraging: post-nesting flatback turtles on the Australian continental shelf. Journal of Experimental Marine Biology and Ecology 477: 112-119.

Whittow, G.C., 1997. Wedge-tailed shearwater (Puffinus pacificus). In: Poole, A. (Ed.) The birds of North America Online, Vol. 305. Ithaca, NY: Cornell Lab of Ornithology.

Woodside Energy Limited, 2004. Environmental impacts of drill cuttings at North Rankin A and Goodwyn A, Woodside Energy Limited, Perth, WA.

Woodside Energy Limited. 2005. The Vincent Development Draft Environmental Impact Statement. Woodside Energy Limited. Perth, Australia.

Woodside Energy Limited, 2006. Pluto LNG development draft Public Environment Report/Public Environment Review (EPBC Act Referral No. 2006/2968). Woodside Energy Limited, Perth.

Woodside Energy Limited, 2011. Browse LNG Development Draft Upstream Environmental Impact Statement (No. EPBC Referral 2008/4111). Woodside Energy Limited, Perth.

Woodside Energy Limited. 2013. Goodwyn Alpha (GWA) Facility Operations Environment Plan Summary. Woodside Energy Limited. Perth, Australia.

Woodside Energy Ltd. 2014. Browse FLNG Development Draft Environmental Impact Statement.

Yender, R., Michel, J., Lord, C., 2002. Managing Seafood Safety after an Oil Spill. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

Zieman, J.C., Orth, R., Phillips, R.C., Thayer, G., Thorhaug, A., 1984. The effects of oil on seagrass ecosystems. In: Cairns, J. Jr. and Buikema, A. L. Jr. (Eds.) Restoration and Management of Marine Ecosystems Impacted by Oil. Butterworth, Boston, pp.37- 64.

Zykov, M. 2013. Underwater Sound Modeling of Low Energy Geophysical Equipment Operations. JASCO Document 00600, Version 2.0. Technical report by JASCO Applied Sciences for CSA Ocean Sciences Inc.

9 GLOSSARY AND ABBREVIATIONS

9.1 Glossary

Term	Meaning
(the) Regulator	The Government Agency (State or Commonwealth) that is the decision maker for approvals and performs ongoing regulation of the approval once granted
3D seismic data	A set of numerous closely-spaced seismic lines that provide a high spatially sampled measure of subsurface reflectivity and 3D image
Acceptability	The EP must demonstrate that the environmental impacts and risks of an activity will be of an acceptable level as per Regulation 10A(c).
ALARP	A legal term in Australian safety legislation, it is taken here to mean that all contributory elements and stakeholdings have been considered by assessment of costs and benefits, and which identifies a preferred course of action
API (gravity)	A measure of how heavy or light a petroleum liquid is compared to water
Australian Standard	An Australian Standard that provides criteria and guidance on design, materials, fabrication, installation, testing, commissioning, operation, maintenance, re-qualification and abandonment
Ballast	Extra weight taken on to increase a ship's stability to prevent rolling and pitching. Most ships use seawater as ballast. Empty tank space is filled with inert (non-combustible) gas to prevent the possibility of fire or explosion.
Bathymetry	Related to water depth, a bathymetry map shows the depth of water at a given location on the map.
Benthos/Benthic	Relating to the seabed and includes organisms living in or on sediments/rocks on the seabed
Biodiversity	Relates to the level of biological diversity of the environment. The EPBC Act defines biodiversity as "the variability among living organisms from all sources (including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part) and includes: (a) diversity within species and between species; and (b) diversity of ecosystems".
Biota	The animal and plant life of a particular region, habitat or geological period
Cetacean	Whale and dolphin species
Consequence	The worst-case credible outcome associated with the selected event, assuming some controls (prevention and mitigation) have failed. Where more than one impact applies (e.g. environmental and legal/compliance), the consequence level for the highest severity impact is selected.
Coral	Anthozoa that are characterised by stone-like, horny or leathery skeletons (external or internal). The skeletons of these animals are also called coral.
Coral Reef	A wave-resistant structure resulting from skeletal deposition and cementation of hermatypic corals, calcareous algae, and other calcium carbonate-secreting organisms
Crustacean	A large and variable group of mostly aquatic invertebrates that have a hard external skeleton (shell), segmented bodies, with a pair of often very modified appendages on each segment, and two pairs of antennae (e.g. crabs, crayfish, shrimps, wood lice, water fleas and barnacles)
Cyclone	A rapidly-rotating storm system characterised by a low-pressure centre, strong winds, and a spiral arrangement of thunderstorms that produce heavy rain
Datum	A reference location or elevation that is used as a starting point for subsequent measurements

Term	Meaning
dB	Decibel, a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (that is, 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies
dB re 1 μPa^2	Measure of underwater noise, in terms of sound pressure. Because the dB is a relative measure rather than an absolute measure, it must be referenced to a standard 'reference intensity', in this case 1 micro Pascal (1 mPa), which is the standard reference that is used. The dB is also measured over a specified frequency, which is usually either a one Hertz bandwidth (expressed as dB re 1 mPa2/Hz), or over a broadband that has not been filtered. Where a frequency is not specified, it can be assumed that the measurement is a broadband measurement.
dB re 1 μPa².s	Normal unit for sound exposure level
Demersal	Living close to the floor of the sea (typically of fish)
Drill casing	Steel pipe placed in the well as drilling progresses to isolate particular formations or zones, prevent the wall of the well bore formations from caving in, providing pressure integrity as the well is constructed to deeper depths
Drilling fluids	The main functions of drilling fluids are to control formation pressures, remove cuttings from the wellbore, seal permeable formations encountered while drilling, cool and lubricate the drill bit, transmit hydraulic energy to downhole tools and the bit and, maintain wellbore stabilit
DRIMS	Woodside's internal document management system
Dynamic positioning	In reference to a marine vessel that uses satellite navigation and radio transponders in conjunction with thrusters to maintain its position
EC_{50}	The concentration of a drug, antibody or toxicant which induces a response halfway between the baseline and maximum after a specified exposure time
Echinoderms	Any of numerous radially symmetrical marine invertebrates of the phylum Echinodermata, which includes the starfishes, sea urchins and sea cucumbers, that have an internal calcareous skeleton and are often covered with spines
Endemic	A species that is native to or confined to a certain region
Environment	The surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelations (Source: ISO 14001)
EP	Prepared in accordance with the *OPGGS (Environment) Regulations 2009*, which must be assessed and accepted by the Designated Authority (NOPSEMA) before any petroleum-related activity can be performed
Environment Regulations	OPGGS (Environment) Regulation 2009
Environmental approval	The action of approving something, which has the potential to have an adverse impact on the environment. Environmental impact assessment is generally required before environmental approval is granted.
Environmental Hazard	The characteristic of an activity or event that could potentially cause damage, harm or adverse effects on the environment
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services (Source: HB 203:2006).
Environmental impact assessment	An orderly and systematic process for evaluating a proposal or scheme (including its alternatives), and its effects on the environment, and mitigation and management of those effects (Source: Western Australian *Environmental Impact Assessment Administrative Procedures 2010*)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth legislation designed to promote the conservation of biodiversity and protection of the environment.
Epifauna	Benthic animals that live on the surface of a substrate

Term	Meaning
Fauna	Collectively, the animal life of a particular region
Flora	Collectively, the plant life of a particular region
IC_{50}	A measure of the effectiveness of a compound in inhibiting biological or biochemical function
Infauna	Aquatic animals that live in the substrate of a body of water, especially in a soft sea bottom
ISO 14001	ISO 14001 is an international standard that specifies a process (called an EMS) for controlling and improving a company's environmental performance. An EMS provides a framework for managing environmental responsibilities so they become more efficient and more integrated into overall business operations.
Jig Fishing	Fishing with a jig, which is a type of fishing lure. A jig consists of a lead sinker with a hook moulded into it and usually covered by a soft body to attract fish.
LC_{50}	The concentration of a substance that is lethal to 50% of the population exposed to it for a specified time
Likelihood	The description that best fits the chance of the selected consequence actually occurring, assuming reasonable effectiveness of the prevention and mitigation controls
MARPOL (73/78)	The International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978. MARPOL 73/78 is one of the most important international marine environmental conventions. It was designed to minimise pollution of the seas, including dumping, oil and exhaust pollution. Its stated objective is to preserve the marine environment through the complete elimination of pollution by oil and other harmful substances and the minimisation of accidental discharge of such substances.
Meteorology	The study of the physics, chemistry and dynamics of the earth's atmosphere, including the related effects at the air–earth boundary over both land and the oceans
Mitigation	Management measures that minimise and manage undesirable consequences
NOHSC (1008:2004)	National Occupational Health and Safety Commission – Approved Criteria for Classifying Hazardous Substances
Oligotrophic	Low in plant nutrients and having a large amount of dissolved oxygen throughout
pH	Measure of the acidity or basicity of an aqueous solution
Protected Species	Threatened, vulnerable or endangered species that are protected from extinction by preventive measures. Often governed by special Federal or State laws.
Putrescible	Refers to food scraps and other organic waste associated with food preparation that will be subject to decay and rot (putrefaction)
Risk	The combination of the consequences of an event and its associated likelihood. For guidance, see Environmental Guidance on Application of Risk Management Procedure.
Stereo-BRUVS	Stereo-baited remote underwater video systems
Sessile	Organism that is fixed in one place; immobile
Syngnathids	Family of fish which includes the seahorses, the pipefishes, and the weedy and leafy sea dragons
Teleost	A fish belonging to the Teleostei or Teleostomi, a large group of fishes with bony skeletons, including most common fishes. The teleosts are distinct from the cartilaginous fishes such as sharks, rays, and skates.
Thermocline	A temperature gradient in a thermally stratified body of water
Zooplankton	Plankton consisting of small animals and the immature stages of larger animals

9.2 Acronyms

Abbreviation	Meaning
µm	Micrometer
350A	350 Australia
ABF	Australian Border Force
AFC	Antifouling Coating
AFFF	Aqueous Film Forming Foam
AFMA	Australian Fisheries Management Authority
AHIS	Aboriginal Heritage Inquiry System
AHO	Australian Hydrographic Office
AHV	Anchor Handling Vessels
AIIMS	Australasian Inter-service Incident Management System
AIMS	Australian Institute of Marine Science
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AMMC	Australian Marine Mammal Centre
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
API	American Petroleum Institute
APPEA	Australian Petroleum Production and Exploration Association
ASAP	As soon as practicable
AS/NZS	Australian/ New Zealand Standards
ATSB	Australian Transport Safety Bureau
AusSAR	Australian Search and Rescue
AUV	Autonomous Underwater Vehicle
AWR	Learmonth Air Weapons Range
BBL	Oil barrel
BC	Bioconcentration
BCF	Bioconcentration Factor
BIA	Biologically Important Area
BoM	Bureau of Meteorology
BOP	Blow-out Preventer
BPT	Ball Penetrometer Test
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C	Moderate

Abbreviation	Meaning
CALM	Department of Conservation and Land Management
CAR	Campaign Action Register
CCL	Casing Collar Locator
CCL	Casing Collar Locator
CCP	Cyclone Contingency Plan
CCWA	Conservation Council of Western Australia
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CFA	Commonwealth Fisheries Association
CH4	Methane
CIMT	Corporate Incident Management Team
CMID	Common Marine Inspection Document
CMP	Conservation Management Plan
CMT	Crisis Management Team
CO	Carbon Monoxide
CO2	Carbon Dioxide
CoA	Commonwealth of Australia
COLREGS	International Regulations for Prevention of Collisions at Sea
CS	Cost/Sacrifice
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
CV	Company Values
D&C	Drilling & Completions
dB	Decibel
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DDR	Deep Directional Resistivity
DCCEEW	Department of Climate Change, Energy, Environment and Water
DEA	Doctors for the Environment Australia
DEWHA	Department of Environment, Water, Heritage and the Arts
DIIS	Department of Industry Innovation and Science
DISER	Department of Industry, Science, Energy and Resources
DMIRS	Department of Mines, Industry Regulation and Safety
DMP	Department of Mines and Petroleum
DNP	Director of National Parks
DAWE	Department of Agriculture, Water and the Environment
DoD	Department of Defence
DoEE	Department of the Environment and Energy
DoF	Department of Fisheries (now part of DMIRS)

Abbreviation	Meaning
DoT	Department of Transport
DotE	Department of the Environment
DP	Dynamic Positioning
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EBSA	Ecologically or Biologically Significant Marine Area
EC_{50}	half maximal effective concentration
EDS	Emergency Disconnect Sequence
EMBA	Environment that May Be Affected
EMS	Environmental Management System
ENVID	Environmental hazard Identification
EP	Environment Plan
EPO	Environmental Performance Outcome
EPS	Environmental Performance Standard
ERM	Environmental Resource Management
ERP	Emergency Response Plans
ERT	Emergency Response Team
ESD	Ecological Sustainable Development
F	Control Feasibility
FARA	Friends of Australian Rock Art. Inc
FEWD	Formation Evaluation While Drilling
FFFP	Film Forming Fluroprotein Foams
FLNG	Floating Liquefied Natural Gas units
FPSO	Floating Production, Storage and Offtake vessel
FPU	Floating Production Unit
FSP	First Strike Plan
FST	Functional Support Team
g/m^2	Grams per square metre
GAP	Greenpeace Australia Pacific
GHG	Greenhouse Gas
GP	Good Practice
GR	Gamma Ray
GWA	Goodwyn Alpha
HF	High Frequency
HFC	Hydrofluorocarbons
HFO	Heavy Fuel Oil
HOCNF	Harmonised Offshore Chemical Notification Format

Abbreviation	Meaning
HQ	Hazard Quotient
HSE	Health, Safety and Environment
IAP	Incident Action Plan
IAPP	International Air Pollution Prevention
IBC	Intermediate Bulk Container
IC	Incident Controller
ICLDP	Incident and Crisis Leadership Development Program
IC_{50}	Half maximal inhibitory concentration
IEA	International Energy Agency
IMCA	International Marine Contractors Association
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMMR	Inspection, Maintenance, Monitoring, Repair
IMO	International Marine Organisation
IMR	Inspection, Maintenance and Repair
IMS	Invasive Marine Species
IMSMA	Information Management System for Mine Action
IPIECA	International Petroleum Industry Environmental Conservation Association
ISPP	International Sewage Pollution Prevention Certificate
ITF	Indonesian Through Flow
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union for Conservation of Nature
JDP2	Julimar Development Project Phase 2
JDP3	Julimar Development Project Phase 3
JRCC	Joint Rescue Coordination Centre
JSA	Job Safety Analysis
Julimar South-1	Julimar Appraisal Well *(Previously known as JULA-P)*
KEF	Key Ecological Feature
kHz	Kilohertz
km	Kilometre
KPI	Key Performance Indicator
L	Litres
LBL	Long Baseline
LC_{50}	Lethal concentration, 50%
LCS	Legislation, Codes and Standards
LF	Low Frequency
LNG	Liquefied Natural Gas
LTGA	Lock the Gate
LWI	Light Well Intervention

Abbreviation	Meaning
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multibeam Echo Sounders
MC	Measurement Criteria
MDO	Marine Diesel Oil
MEG	Mono-ethylene Glycol
MFO	Marine Fauna Observers
MMSI	Maritime Mobile Service Identity
MNES	Matters of National Environmental Significance
MOC	Management of Change
MODU	Mobile Offshore Drilling Unit
MoU	Mobile Offshore Unit
MPA	Marine Protected Areas
MPRA	Marine Parks and Reserves Authority
MSIN	Maritime Safety Information Notifications
N_2O	Nitrous Oxide
NCVA	National Conservation Values Atlas
NIMS	Non-indigenous Marine Species
NLPG	National Light Pollution Guidelines
nm	Nautical mile (1,852 m) a unit of distance on the sea
NMFS	National Marine Fisheries Service
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
NOx	Oxides of Nitrogen
NTM	Notice to Mariners
NWBM	Non Water-Based Mud
NWMR	North-west Marine Region
NWS	North-west Shelf
NWXA	North West Exercise Area
OCNS	Offshore Chemical Notification Scheme
OILMAP	Oil Spill Mapping and Analysis Program
OIM	Offshore Installation Manager
OIW	Oil in Water
OOC	Oil on cuttings
OPP	Offshore Project Proposal
OPEP	Oil Pollution Emergency Plan
OPGGS	Offshore Petroleum and Greenhouse Gas Storage

Abbreviation	Meaning
OSPAR	Oslo and Paris Commission for the Convention for the Protection of the Marine Environment of the North-East Atlantic
OSREC	Oil Spill Response Skills Enhancement Course
OSRL	Oil Spill Response Limited
OSRO	Oil Spill Response Organisation
OVID	Offshore Vessel Inspection Database
OVMSA	Offshore Vessel Safety Management System assessment
PAA	Petroleum Activity Area
PAD	Pump and Dump
PAH	Polyaromatic Hydrocarbon
PAM	Passive Acoustic Monitoring
PBA	Pre-emptive Baseline Areas
PBW	Pygmy Blue Whale
PCPT	Pore Cone Penetration Testing
PFC	Perfluorocarbons
PHB	Hydrated Bentonite Sweeps
PJ	Professional Judgement
PK	Peak Pressure
PLONOR	OSPAR definition of a substance Poses Little Or NO Risk to the environment
PM10	Particulate Matter less than 10 microns
PMST	Protected Matters Search Tool
PPA	Pearl Producers Association
ppb	Parts Per Billion
ppm	Parts Per Million
PS	Performance Standards
PSD	Particle Size Distribution
PSU	Practical Salinity Unit
PTS	Permanent Threshold Shift
PTW	Permit To Work
RCC	Rescue Coordination Centre
RMR	Riserless Mud Recovery
RMS	Root Mean Square
RO	Reverse Osmosis
ROV	Remotely Operated Vehicle
SBP	Sub Bottom Profilers
S-BRUVS	Stereo-baited Remote Underwater Video System
SCE	Solids Control Equipment
SCERP	Source Control Emergency Response Plan

Abbreviation	Meaning
SEEMP	Ship Energy Efficiency Management Plan
SEL	Sound Exposure Level
SF6	Sulphur hexafluoride
SFRT	Subsea First Response Toolkit
SIMAP	Spill Impact Mapping and Analysis Program
SIMOPS	Simultaneous Operations
SMPEP	Spill Monitoring Programme Execution Plan
SO2	Sulphur Dioxide
SOLAS	Safety of Life at SEA
SOPEP	Ship Oil Pollution Emergency Plan
SPL	Sound Pressure Level
SSDI	Subsea Dispersant Injection
SSPL	Subsea and Pipeline
SSS	Side Scan Sonars
SV	Societal Values
SW	Southwest
SWMR	South-west Marine Region
TBT	T-bar Penetrometer Test
TSS	Total Suspended Solids
TTS	Temporary Threshold Shift
UHC	Ultimate Holding Capacity
UK	United Kingdom
USBL	Ultra-short baseline
USIT	Ultrasonic Imaging Tool
UXO	Unexploded Ordinance
VOC	Volatile Organic Hydrocarbons
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WANCSF	Western Australia North Coast Shark Fishery
WBM	Water-Based Mud
WCC	Woodside Communication Centre
WCBD	Well Control Bridging Document
WEL	Woodside Energy Ltd
WIV	Well Intervention Vessel
WLS	Woodside Learning Service
WMS	Woodside Management System
WOMP	Well Operation Management Plan
Woodside	Woodside Energy Ltd

Abbreviation	Meaning
XPT	Formation Pressures

APPENDIX A. WOODSIDE HEALTH AND SAFETY, ENVIRONMENT AND BIODIVERSITY AND RISK MANAGEMENT POLICIES

WOODSIDE POLICY

Woodside Energy

Health and Safety Policy

OBJECTIVES

At Woodside we believe that process and personal safety related incidents, and occupational illnesses are preventable. We strive to be an industry leader in health and safety and are committed to managing our activities to minimise adverse health and safety risk related impacts.

PRINCIPLES

Woodside will achieve this by:

- Implementing a systematic approach to health, personal safety, and process safety risk management.
- Maintaining a culture in which everybody is aware of their health and safety obligations and are empowered to speak up and intervene on health and safety issues.
- Identifying current and emerging hazards across the value chain activities to reduce risks to as low as reasonably practicable.
- Embedding health and safety management in our business planning and decision-making processes.
- Integrating health, personal safety and process safety requirements when designing, purchasing, constructing, and modifying equipment and facilities including requiring our contractors to comply with our HSE expectations in a mutually beneficial manner.
- Complying with relevant laws and regulations and applying responsible standards where laws do not exist.
- Setting targets and publicly reporting on our health and safety performance to help us continually improve.

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 leaders are also responsible for promotion of this Policy in non-operated joint ventures.

This Policy will be reviewed regularly and updated as required.

Revised by the Woodside Energy Group Ltd Board in December 2022

DRIMS# 3475310

Page 1 of 1

APPROVED

WOODSIDE POLICY

Woodside Energy

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 deforestation[1] 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 metres and a canopy cover of more than 10 percent on the land to be cleared'.

DRIMS# 1401783899

Page 1 of 1

APPROVED

WOODSIDE POLICY

Woodside Energy

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 2022.

DRIMS# 8692011

Page 1 of 1

APPROVED

APPENDIX B. RELEVANT REQUIREMENTS

The below table refers to Commonwealth Legislation related to the activity

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.

Commonwealth Legislation	Legislation Summary
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.
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 2009* • *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.

Commonwealth Legislation	Legislation Summary
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.
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.

APPENDIX C. EPBC ACT PROTECTED MATTERS SEARCH

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: 16-Nov-2022

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:	23
Listed Migratory Species:	37

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:	65
Whales and Other Cetaceans:	28
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:	26
Key Ecological Features (Marine):	2
Biologically Important Areas:	6
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
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
FISH		

Scientific Name	Threatened Category	Presence Text
[Thunnus maccoyii](#) Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Migration route known to occur within area
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
REPTILE		
[Aipysurus apraefrontalis](#) Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
SHARK		
[Carcharias taurus (west coast population)](#) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat 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
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat 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
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	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 may occur within area
[Phaethon lepturus fulvus](#) Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Fish		
[Acentronura larsonae](#) Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
[Bulbonaricus brauni](#) Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
[Campichthys tricarinatus](#) Three-keel Pipefish [66192]		Species or species habitat may occur within area
[Choeroichthys brachysoma](#) Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
[Choeroichthys latispinosus](#) Muiron Island Pipefish [66196]		Species or species habitat may occur within area
[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

Scientific Name	Threatened Category	Presence Text
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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 may 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
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
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
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		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

Scientific Name	Threatened Category	Presence Text
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 acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
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

Current Scientific Name	Status	Type of Presence
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
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Orcaella heinsohni 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
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

Current Scientific Name	Status	Type of Presence
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		
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Gorgon Gas Development	2003/1294	Controlled Action	Post-Approval
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Not controlled action			
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	Not Controlled Action	Completed
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled Action (Particular Manner)	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609	Not Controlled Action (Particular Manner)	Post-Approval
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Continental Slope Demersal Fish Communities	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Marine Turtles		
Natator depressus		
Flatback Turtle [59257]	Internesting buffer	Known to occur
Seabirds		
Ardenna pacifica		
Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Sharks		
Rhincodon typus		
Whale Shark [66680]	Foraging	Known to occur
Whales		
Balaenoptera musculus brevicauda		
Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda		
Pygmy Blue Whale [81317]	Migration	Known to occur
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.

Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

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: 15-Nov-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	2
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	58
Listed Migratory Species:	69

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:	49
Commonwealth Heritage Places:	3
Listed Marine Species:	137
Whales and Other Cetaceans:	34
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	19
Habitat Critical to the Survival of Marine Turtles:	4

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	24
Regional Forest Agreements:	None
Nationally Important Wetlands:	3
EPBC Act Referrals:	208
Key Ecological Features (Marine):	11
Biologically Important Areas:	48
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
The Ningaloo Coast	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Historic		
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
Natural		
The Ningaloo Coast	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
EEZ and Territorial Sea
Extended Continental Shelf

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
CRUSTACEAN		
Kumonga exleyi Cape Range Remipede [86875]	Vulnerable	Species or species habitat known to occur within area
FISH		

Scientific Name	Threatened Category	Presence Text
Milyeringa veritas		
Cape Range Cave Gudgeon, Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
Ophisternon candidum		
Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies		
Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus		
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon auratus barrowensis		
Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus		
Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Lagorchestes hirsutus Central Australian subspecies		
Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Macroderma gigas		
Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Osphranter robustus isabellinus		
Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known 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 known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus		
Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Egernia stokesii badia		
Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Centrophorus zeehaani		
Southern Dogfish, Endeavour Dogfish, Little Gulper Shark [82679]	Conservation Dependent	Species or species habitat likely to occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area

Migratory Marine Species

Scientific Name	Threatened Category	Presence Text
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat likely to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50127]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50125]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50126]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50124]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50128]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50129]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50123]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50122]	WA
Defence - LEARMONTH - AIR WEAPONS RANGE [50193]	WA
Defence - LEARMONTH RADAR SITE - TWIN TANKS EXMOUTH [50002]	WA
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH [50001]	WA
Unknown	
Commonwealth Land - [51471]	WA
Commonwealth Land - [51474]	WA
Commonwealth Land - [51473]	WA
Commonwealth Land - [51476]	WA
Commonwealth Land - [51458]	WA

Commonwealth Land Name	State
Commonwealth Land - [51884]	WA
Commonwealth Land - [51465]	WA
Commonwealth Land - [51464]	WA
Commonwealth Land - [51467]	WA
Commonwealth Land - [51466]	WA
Commonwealth Land - [51461]	WA
Commonwealth Land - [51460]	WA
Commonwealth Land - [51463]	WA
Commonwealth Land - [51462]	WA
Commonwealth Land - [51445]	WA
Commonwealth Land - [51444]	WA
Commonwealth Land - [51472]	WA
Commonwealth Land - [51475]	WA
Commonwealth Land - [51449]	WA
Commonwealth Land - [51448]	WA
Commonwealth Land - [51457]	WA
Commonwealth Land - [51451]	WA
Commonwealth Land - [51455]	WA
Commonwealth Land - [51454]	WA
Commonwealth Land - [51442]	WA
Commonwealth Land - [51443]	WA
Commonwealth Land - [51446]	WA
Commonwealth Land - [51447]	WA
Commonwealth Land - [51469]	WA
Commonwealth Land - [51459]	WA
Commonwealth Land - [51477]	WA
Commonwealth Land - [52236]	WA

Commonwealth Land Name	State
Commonwealth Land - [51450]	WA
Commonwealth Land - [51452]	WA
Commonwealth Land - [51453]	WA
Commonwealth Land - [51456]	WA
Commonwealth Land - [51470]	WA
Commonwealth Land - [51468]	WA

Commonwealth Heritage Places

[Resource Information]

Name	State	Status
Historic		
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
Natural		
Learmonth Air Weapons Range Facility	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat likely to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Stercorarius skua as Catharacta skua Great Skua [823]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thalasseus bengalensis as Sterna bengalensis		
Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii		
Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area
Fish		
Acentronura australe		
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Acentronura larsonae		
Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata		
Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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 breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammal		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Reptile		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus pooleorum Shark Bay Seasnake [66061]		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	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known 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
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may 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	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
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 acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Orcaella heinsohni as Orcaella brevirostris Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris		
Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks

[Resource Information]

Park Name	Zone & IUCN Categories
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Shark Bay	Multiple Use Zone (IUCN VI)
Abrolhos	National Park Zone (IUCN II)
Abrolhos	National Park Zone (IUCN II)
Abrolhos	National Park Zone (IUCN II)
Gascoyne	National Park Zone (IUCN II)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)

Park Name	Zone & IUCN Categories
Ningaloo	Recreational Use Zone (IUCN IV)
Abrolhos	Special Purpose Zone (IUCN VI)
Abrolhos	Special Purpose Zone (IUCN VI)

Habitat Critical to the Survival of Marine Turtles

Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Airlie Island	Nature Reserve	WA
Barrow Island	Nature Reserve	WA
Barrow Island	Marine Management Area	WA
Barrow Island	Marine Park	WA
Bessieres Island	Nature Reserve	WA
Boodie, Double Middle Islands	Nature Reserve	WA
Bundegi Coastal Park	5(1)(h) Reserve	WA
Cape Range	National Park	WA

Protected Area Name	Reserve Type	State
Great Sandy Island	Nature Reserve	WA
Jurabi Coastal Park	5(1)(h) Reserve	WA
Lowendal Islands	Nature Reserve	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Marine Park	WA
Muiron Islands	Nature Reserve	WA
Muiron Islands	Marine Management Area	WA
Ningaloo	Marine Park	WA
Round Island	Nature Reserve	WA
Serrurier Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Unnamed WA40322	5(1)(h) Reserve	WA
Unnamed WA40828	5(1)(h) Reserve	WA
Unnamed WA41080	5(1)(h) Reserve	WA
Unnamed WA44665	5(1)(h) Reserve	WA

Nationally Important Wetlands	[Resource Information]
Wetland Name	State
Bundera Sinkhole	WA
Cape Range Subterranean Waterways	WA
Learmonth Air Weapons Range - Saline Coastal Flats	WA

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
Midwest Offshore Wind Farm	2022/09264		Assessment
Project Highclere Cable Lay and Operation	2022/09203		Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Action clearly unacceptable			
Highlands 3D Marine Seismic Survey	2012/6680	Action Clearly Unacceptable	Completed
Controlled action			
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval
Ashburton Infrastructure Project	2021/9064	Controlled Action	Guidelines Issued
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Develop Jansz-Io deepwater gas field in Permit Areas WA-18-R, WA-25-R and WA-26-	2005/2184	Controlled Action	Post-Approval
Development of Angel gas and condensate field, North West Shelf	2004/1805	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval
Echo-Yodel Production Wells	2000/11	Controlled Action	Post-Approval
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Gorgon Gas Development	2003/1294	Controlled Action	Post-Approval
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Gorgon Gas Revised Development	2008/4178	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Greater Gorgon Development - Optical Fibre Cable, Mainland to Barrow Island	2005/2141	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Light Crude Oil Production	2001/365	Controlled Action	Post-Approval
Mauds Landing Marina	2000/98	Controlled Action	Completed
Nava-1 Cable System	2001/510	Controlled Action	Completed
Ningaloo Lighthouse Development, 17km north west Exmouth, Western Australia	2020/8693	Controlled Action	Assessment Approach
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
Simpson Oil Field Development	2001/227	Controlled Action	Post-Approval
Single Jetty Deep Water Port Renewable Hub, WA	2021/8942	Controlled Action	Proposed Decision
The Scarborough Project - FLNG & assoc subsea infrastructure, Carnarvon Basin	2013/6811	Controlled Action	Post-Approval
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Yardie Creek Road Realignment Project	2021/8967	Controlled Action	Assessment Approach
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed
Airlie Island soil and groundwater investigations, Exmouth Gulf, offshore Pilbara coast	2014/7250	Not Controlled Action	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
Baniyas-1 Exploration Well, EP-424, near Onslow	2007/3282	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Barrow Island 2D Seismic survey	2006/2667	Not Controlled Action	Completed
Bollinger 2D Seismic Survey 200km North of North West Cape WA	2004/1868	Not Controlled Action	Completed
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103	Not Controlled Action	Completed
Carnarvon 3D Marine Seismic Survey	2004/1890	Not Controlled Action	Completed
Cazadores 2D seismic survey	2004/1720	Not Controlled Action	Completed
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	Not Controlled Action	Completed
Controlled Source Electromagnetic Survey	2007/3262	Not Controlled Action	Completed
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033	Not Controlled Action	Completed
Differential Global Positioning System (DGPS)	2001/445	Not Controlled Action	Completed
Drilling between Kalbarri and Cliff Head	2005/2185	Not Controlled Action	Completed
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701	Not Controlled Action	Completed
Eagle-1 Exploration Drilling, North West Shelf, WA	2019/8578	Not Controlled Action	Completed
Echo A Development WA-23-L, WA-24-L	2005/2042	Not Controlled Action	Completed
Exploration drilling well WA-155-P(1)	2003/971	Not Controlled Action	Completed
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Exploration Well (Taunton-2)	2002/731	Not Controlled Action	Completed
Exploration Well in Permit Area WA-155-P(1)	2002/759	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Exploratory drilling in permit area WA-225-P	2001/490	Not Controlled Action	Completed
Hadda 1,Flying Foam 1,Magnat 1 exploration drill	2004/1697	Not Controlled Action	Completed
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed
Hess Exploration Drilling Programme	2007/3566	Not Controlled Action	Completed
Huascaran-1 exploration well (WA-292-P)	2001/539	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Infill Production Well (Griffin-9)	2001/417	Not Controlled Action	Completed
Jansz-2 and 3 Appraisal Wells	2002/754	Not Controlled Action	Completed
Klammer 2D Seismic Survey	2002/868	Not Controlled Action	Completed
Mahimahi Aquaculture Facility	2002/891	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	Not Controlled Action	Completed
Manaslu - 1 and Huascaran - 1 Offshore Exploration Wells	2001/235	Not Controlled Action	Completed
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed
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
Spool Base Facility	2001/263	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed
sub-sea tieback of Perseus field wells	2004/1326	Not Controlled Action	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836	Not Controlled Action	Completed
Thevenard Island Retirement Project	2015/7423	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
WA-295-P Kerr-McGee Exploration Wells	2001/152	Not Controlled Action	Completed
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed
Western Flank Gas Development	2005/2464	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Kate' 3D marine seismic survey, exploration permits WA-320-P and WA-345-P, 60km	2005/2037	Not Controlled Action (Particular Manner)	Post-Approval
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval
2D marine seismic survey	2012/6296	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey Permit Area WA-352-P	2008/4628	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey within permit WA-291	2007/3265	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey	2008/4281	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey (WA-482-P, WA-363-P), WA	2013/6761	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey over petroleum title WA-268-P	2007/3458	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D Seismic Survey in the Carnarvon Bsin on the North West Shelf	2002/778	Not Controlled Action (Particular Manner)	Post-Approval
3D sesmic survey	2006/2781	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Agrippina 3D Seismic Marine Survey	2009/5212	Not Controlled Action (Particular Manner)	Post-Approval
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Artemis-1 Drilling Program (WA-360-P)	2010/5432	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Bonaventure 3D seismic survey	2006/2514	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Charon 3D Marine Seismic Survey	2007/3477	Not Controlled Action (Particular Manner)	Post-Approval
Coverack Marine Seismic Survey	2001/399	Not Controlled Action (Particular Manner)	Post-Approval
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval
Decommissioning of the Legendre facilities	2010/5681	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Draeck 3D Marine Seismic Survey, WA-205-P	2006/3067	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular Manner)	Completed
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M4 4D Marine Seismic Survey	2008/4558	Not Controlled Action (Particular Manner)	Post-Approval
Enfield oilfield 3D Seismic Survey	2006/3132	Not Controlled Action (Particular Manner)	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval
Exploration drilling of Zeus-1 well	2008/4351	Not Controlled Action (Particular Manner)	Post-Approval
Fletcher-Finucane Development, WA26-L and WA191-P	2011/6123	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Geco Eagle 3D Marine Seismic Survey	2008/3958	Not Controlled Action (Particular Manner)	Post-Approval
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	Not Controlled Action (Particular Manner)	Post-Approval
Greater Western Flank Phase 1 gas Development	2011/5980	Not Controlled Action (Particular Manner)	Post-Approval
Grimalkin 3D Seismic Survey	2008/4523	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Harpy 1 exploration well	2001/183	Not Controlled Action (Particular Manner)	Post-Approval
Honeycombs MC3D Marine Seismic Survey	2012/6368	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2009/4801	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2008/4630	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
Klimt 2D Marine Seismic Survey	2007/3856	Not Controlled Action (Particular Manner)	Post-Approval
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Leopard 2D marine seismic survey	2005/2290	Not Controlled Action (Particular Manner)	Post-Approval
Lion 2D Marine Seismic Survey	2007/3777	Not Controlled Action (Particular Manner)	Post-Approval
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Drilling Campaign	2011/5830	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval
Orcus 3D Marine Seismic Survey in WA-450-P	2010/5723	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Palta-1 exploration well in Petroleum Permit Area WA-384-P	2011/5871	Not Controlled Action (Particular Manner)	Post-Approval
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular Manner)	Post-Approval
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Repsol 3d & 2D Marine Seismic Survey	2012/6658	Not Controlled Action (Particular Manner)	Post-Approval
Rose 3D Seismic Program	2008/4239	Not Controlled Action (Particular Manner)	Post-Approval
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval
Salsa 3D Marine Seismic Survey	2010/5629	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
search for HMAS Sydney	2006/3071	Not Controlled Action (Particular Manner)	Post-Approval
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled Action (Particular Manner)	Post-Approval
Sovereign 3D Marine Seismic Survey	2011/5861	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow 4D Marine Seismic Survey	2011/5810	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow Baseline 4D marine seismic survey	2008/4530	Not Controlled Action (Particular Manner)	Post-Approval
Tantabiddi Boat Ramp Sand Bypassing	2015/7411	Not Controlled Action (Particular Manner)	Post-Approval
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	Not Controlled Action (Particular Manner)	Post-Approval
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular Manner)	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a 3D marine seismic survey	2010/5695	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5679	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5715	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic Survey in the offshore northwest Carnarvon Basin	2011/6175	Referral Decision	Completed
3D Seismic Survey	2008/4219	Referral Decision	Completed
Bianchi 3D Marine Seismic Survey, Carnavon Basin, WA	2013/7078	Referral Decision	Completed
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
Rose 3D Seismic acquisition survey	2008/4220	Referral Decision	Completed
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	Referral Decision	Completed
Two Dimensional Transition Zone Seismic Survey - TP/7 (R1)	2010/5507	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Ancient coastline at 90-120m depth	South-west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	South-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west
Perth Canyon and adjacent shelf break, and other west coast canyons	South-west
Western demersal slope and associated fish communities	South-west
Western rock lobster	South-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Dugong		
Dugong dugon Dugong [28]	Breeding	Known to occur
Dugong dugon Dugong [28]	Calving	Known to occur

Scientific Name	Behaviour	Presence
Dugong dugon Dugong [28]	Foraging (high density seagrass beds)	Known to occur
Dugong dugon Dugong [28]	Nursing	Known to occur
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur
Chelonia mydas Green Turtle [1765]	Aggregation	Known to occur
Chelonia mydas Green Turtle [1765]	Basking	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Mating	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Known to occur

Scientific Name	Behaviour	Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Aggregation	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Mating	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Seabirds		
Anous stolidus Common Noddy [825]	Foraging (provisioning young)	Known to occur
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur

Scientific Name	Behaviour	Presence
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
Onychoprion fuscata Sooty Tern [82847]	Foraging	Known to occur
Pelagodroma marina White-faced Storm petrel [1016]	Foraging (in high numbers)	Known to occur
Phaethon lepturus White-tailed Tropicbird [1014]	Breeding	Known to occur
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Foraging (provisioning young)	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Rhincodon typus Whale Shark [66680]	Foraging (high density prey)	Known to occur
Whales		

Scientific Name	Behaviour	Presence
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Known Foraging Area	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	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.

Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

APPENDIX D. OIL SPILL PREPAREDNESS AND RESPONSE STRAETEGY SELECTION AND EVALUATION

Oil Spill Preparedness and Response Mitigation Assessment for Julimar Appraisal Drilling & Surveys

Corporate HSE

Hydrocarbon Spill Preparedness

April 2023

Revision 0

TABLE OF CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

Woodside Energy Julimar Pty Ltd (Woodside) has developed its oil spill preparedness and response position for the Julimar Appraisal Drilling and Surveys hereafter known as the Petroleum Activities Program (PAP).

This document demonstrates 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 Scenarios	**Credible Scenario-01 (CS-01): Unplanned hydrocarbon release of Julimar Condensate (JULA-04) – loss of well containment** 54,520 m^3 release of Julimar Condensate over 77[1] days from Julimar South-1 (JS-1) well (20° 09' 52.289°S, 115°02' 35.331°E) comprising a 5-day surface release via MODU of 3023 m^3 followed by a 72-day subsea release of 51,497 m^3. 6.5% residual component of 3543.8 m^3	Section 2.2
	Credible Scenario-02 (CS-02)[2]: A short-term (instantaneous) uncontrolled surface release of Marine Diesel Oil (MDO) 2000 m^3 release from a vessel, representing loss of containment after a fuel tank rupture following a collision. 5% residual component of 100 m^3.	
Hydrocarbon Properties	**Julimar (JULA-04) Condensate** Julimar (JULA-04) Condensate (API 45.7) is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 43.6% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); up to a further 22.9% could evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 27.1% should evaporate over several days (265 °C < BP < 380 °C). Approximately 6.5% 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.	Section 2.2.1 Section 6.7 of the EP Appendix A of the First Strike Plan
	Marine Diesel Oil (MDO)	

[1] 77 days was the approximation upon which the credible spill assessment was performed. Subsequent calculations, during Well Operations Management Plan (WOMP) preparation, has reduced this to 61 days. Therefore, 61 days has been applied to the performance standards in Sections 5.2 and 6.2 of this document and utilised in the preparation of well construction WOMP and activity Source Control Emergency Response Plan (SCERP).

[2] Loss of marine vessel separation MDO modelling of 2000 m^3 was available close to the JULA-K well location, 2 km from JS-1 well and within the same title (WA-5-L). It was originally undertaken in 2019 and reprocessed later in 2019 using NOPSEMA's contemporary modelling thresholds. The largest tank of the vessel proposed for the JS-1 Well Intervention activity is also 2000 m^3. Given that spill parameters and geographic location fall within the envelope of the existing MDO modelling, it is an appropriate surrogate and therefore additional modelling was not required.

<table>
<tr><td></td><td colspan="3">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 (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%.</td><td></td></tr>
<tr><td rowspan="5">Modelling Results</td><td colspan="3">Stochastic modelling

A quantitative, stochastic assessment has been undertaken for CS-01 (Julimar condensate) and CS-02 (marine diesel oil) (Table 2-1) to help assess the environmental risk of a hydrocarbon spill.

A total of 100 replicate simulations were completed for the CS-01 and 200 for CS-02 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.</td><td rowspan="2">Section 2.3</td></tr>
<tr><td colspan="3">Deterministic modelling

Deterministic modelling is undertaken where initial stochastic modelling has indicated that floating oil is present at an impact threshold of 50 g/m^2 and/or where there is shoreline accumulations at an impact threshold of 100 g/m^2. The deterministic modelling outputs are then used to scale the required capability for the offshore (containment and recovery and dispersant) and/or shoreline responses.

The stochastic modelling undertaken for both CS-01 and CS-02 does not predict any floating or shoreline oil at these thresholds thus deterministic modelling was not undertaken. Stochastic modelling has been used to scale the response.

Results as follows:</td><td rowspan="4"></td></tr>
<tr><td></td><td>CS-01: Hydrocarbon release caused by loss of well containment (54,520 m^3 of Julimar Condensate over 77 days)</td><td>CS-02: Hydrocarbon release caused by vessel collision (instantaneous release of 2000 m^3 MDO)</td></tr>
<tr><td>Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a concentration of 10 g/m^2)</td><td>No contact at threshold</td><td>3 hours (Montebello Marine Park)</td></tr>
<tr><td>Minimum time to commencement of oil accumulation at any shoreline receptor (at a threshold of 100 g/m^2)</td><td>No contact at threshold</td><td>No contact at threshold</td></tr>
</table>

	Maximum cumulative oil volume accumulated at any individual shoreline receptor (at concentrations in excess of 100 g/m^2)	*No contact at threshold*	*No contact at threshold*	
	Maximum cumulative oil volume accumulated across all shoreline receptors (at concentrations in excess of 100 g/m^2)	*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)	51 hours (Montebello Marine Park)	3 hours (Montebello Marine Park)	
Net Environmental Benefit Assessment	Operational monitoring, source control via capping stack, source control via relief well drilling, source control (vessel), 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 risks and impacts presented in Section 2 and Section 3, including the implementation of considered additional, alternative or improved control measures.			Section 5 Section 6

1 INTRODUCTION

1.1 Overview

Woodside has developed its oil spill preparedness and response position for the Julimar Appraisal Drilling and Surveys, hereafter known as the 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 Julimar Appraisal Drilling and Surveys Environmental Plan (EP)
- Oil Pollution Emergency Arrangements (OPEA) (Australia)
- the Julimar Appraisal Drilling and Surveys Oil Pollution Emergency Plan (OPEP) including:
  - First Strike Plan (FSP)
  - relevant Operations Plans
  - relevant Tactical Response Plans (TRPs)
  - relevant Supporting Plans
  - Data Directory.

1.3 Scope

This document demonstrates that the risks and impacts from an unplanned hydrocarbon release, and the associated response operations, are controlled to As Low as Reasonably Practicable (ALARP) and 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 3.2 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 to ensure 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.

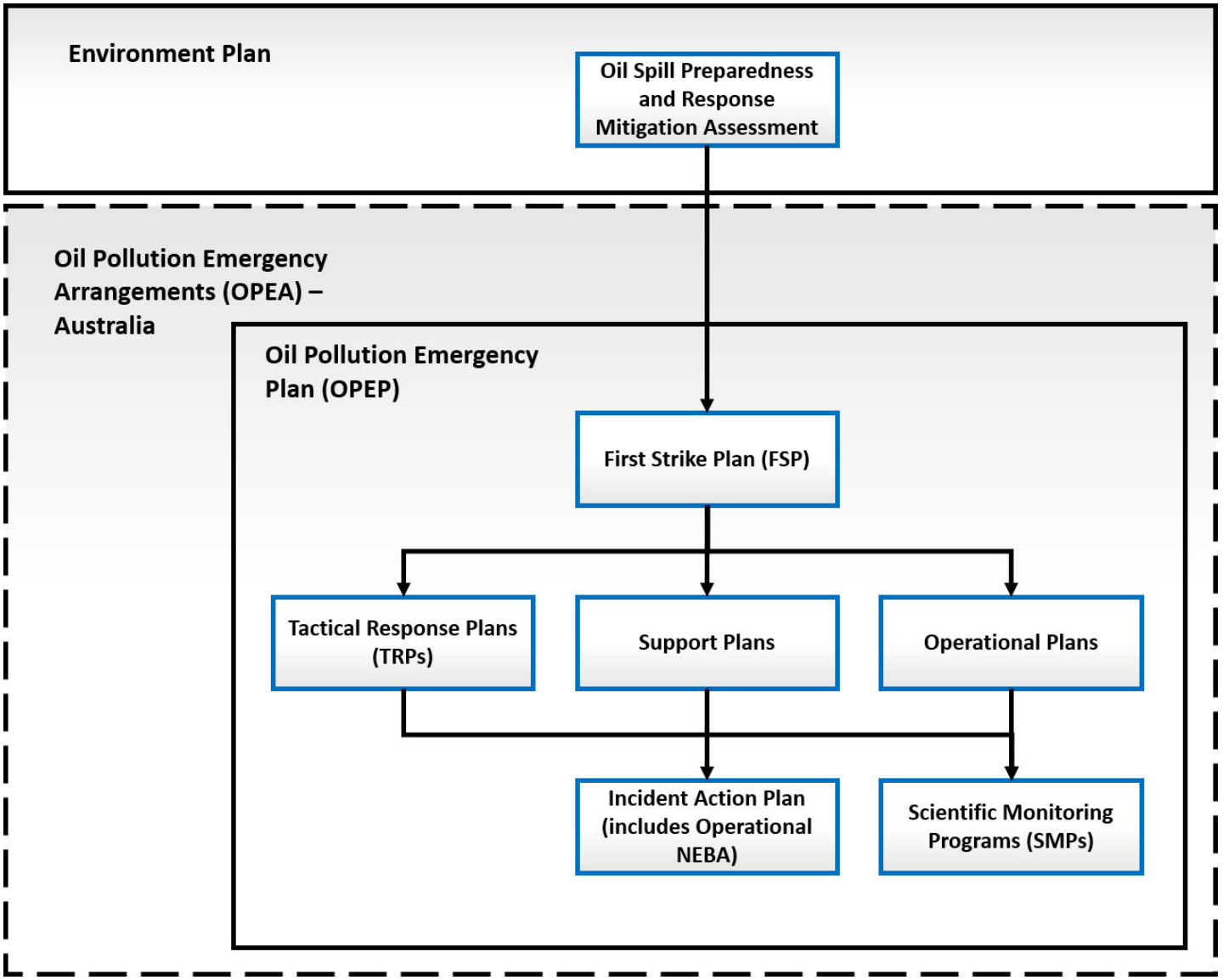


Figure 1-1: Woodside hydrocarbon spill document structure

Table 1-1: Hydrocarbon spill preparedness and response – document references

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Julimar Appraisal Drilling and Surveys EP	Demonstrates potential adverse impacts on the environment associated with the Julimar Appraisal Drilling and Surveys (during both routine and non-routine operations) are mitigated and managed to ALARP and will be of an acceptable level.	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).	
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 sections	
Oil Spill Preparedness and Response Mitigation Assessment for the Julimar Appraisal Drilling and Surveys (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.	
Julimar Appraisal Drilling and	Facility specific document providing details and tasks required to mobilise a first strike response.	Site-based IMT for initial response, activation and notification.	Initial notifications and reporting required within the first 24 hours of a spill event.	

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Surveys Oil Pollution FSP	Primarily applied to the first 24 hours of a response until a full IAP specific to the event is developed. Oil Pollution FSPs are intended to be the first document used to provide immediate guidance to the responding IMT.	CIMT for initial response, activation and notification. CIMT: Control function in an ongoing spill response for activity-specific response information.	Relevant spill response options that could be initiated for mobilisation in the event of a spill. Recommended pre-planned tactics. Details and forms for use in immediate response. Activation process for oil spill trajectory 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 functions for first strike activities. CIMT: Planning Function 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 Operational Plan Source Control Emergency Response Planning Guideline Protection and Deflection Operational Plan Shoreline Clean-up Operational Plan Oiled Wildlife Response Operational Plan Scientific Monitoring Operational Plan

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Tactical Response Plans	Provides options for response techniques in selected Response Protection Areas (RPAs). Provides site, access and deployment information to support a response at the location.	CIMT: Planning Function to help develop IAPs, and Logistics function 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 please 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 functions.	Strategy for mobilising and managing additional resources outside of Woodside's immediate preparedness arrangements.	Logistics Support Plan Aviation Support Plan Marine Support Plan Health and Safety Support Plan Hydrocarbon Spill Responder Health Monitoring Guideline People and Global Capability (Surge Labour Requirements) Plan (Land based) Security Support Plan Stakeholder Engagement Support Plan Guidance for Hydrocarbon Spill Claims Management IT (First Strike Response) IT (Extended Response) Accommodation and Catering Support Plan Australia – Communications Support Plan Australia – Transport Management Plan Australia – Waste Management Plan

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 Julimar Appraisal Drilling and Surveys FSP 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.

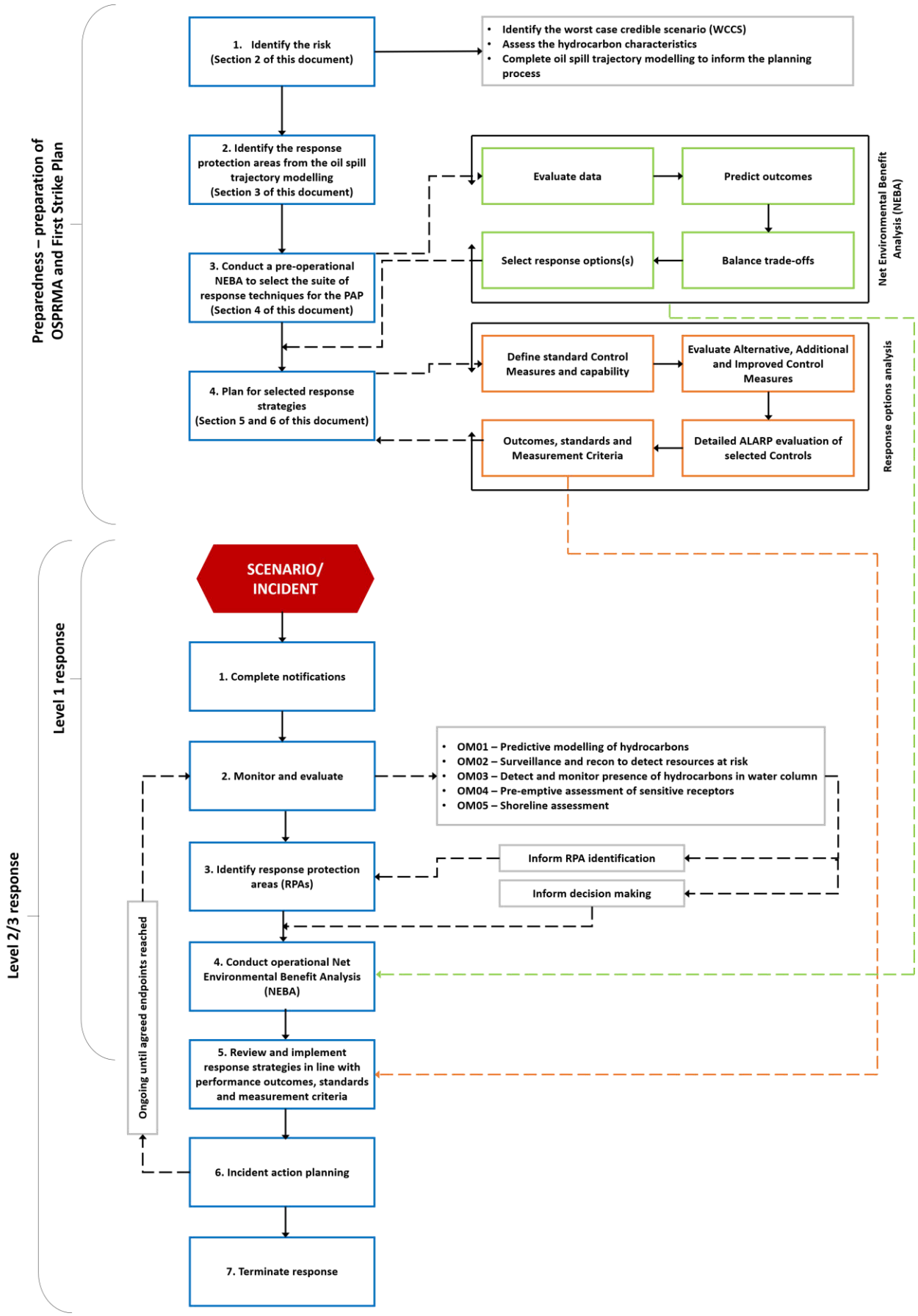


Figure 2-1: Response planning and selection process

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 >100g/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 ensure 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 the 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 – Timing, Resourcing and Effectiveness

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.

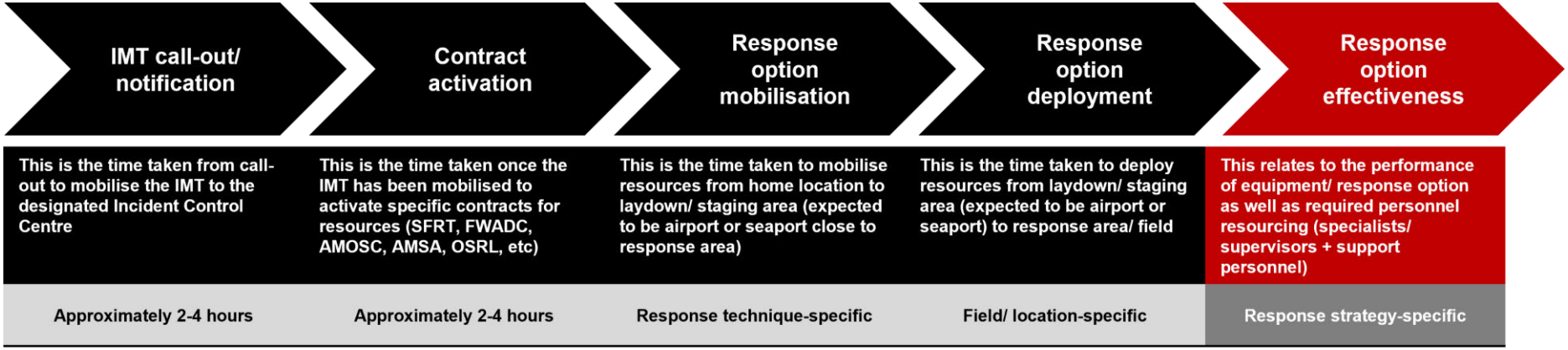


Figure 2-2: Response Planning Assumptions – Timing, Resourcing and Effectiveness

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. Two 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.

The loss of well containment scenario (CS-01) and the vessel collision scenario (CS-02) were stochastically modelled and are considered to determine the WCCS for response planning purposes.

Table 2-1: Petroleum Activities Program credible spill scenarios

Credible spill scenario	Scenario selected for planning purposes	Scenario description	Maximum credible volume released (liquid m^3)	Incident Level	Hydrocarbon type	Residual proportion	Residual volume (liquid m^3)
CS-01	Yes	Loss of well containment during drilling of development JS-1 well. A long-term (77-day[3]) uncontrolled surface/subsurface release of Julimar condensate (JULA-04) representing loss of containment after a loss of well containment.	Surface (5 days): ~3023 m^3 Subsea (72 days): ~51,497 m^3 Total Volume (77 days): ~54,520 m^3	3	Julimar condensate (JULA-04)	6.5%	3543.8 m^3
CS-02	Yes	Hydrocarbon release caused by vessel collision: installation vessel and fuel tanker	2000 m^3 [4]	3	Marine diesel	5%	100 m^3
CS-03	No	Hydrocarbon release due to diesel bunkering loss of containment	50 m^3	1	Marine diesel	5%	2.5 m^3

[3] 77 days was the approximation upon which the credible spill assessment was performed. Subsequent calculations, during WOMP preparation, has reduced this to 61 days. Therefore, 61 days has been applied to the performance standards in Sections 5.2 and 6.2 of this document and utilised in the preparation of well construction WOMP and activity SCERP.

[4] Loss of marine vessel separation MDO modelling of 2000 m^3 was available close to the JULA-K well location, 2 km from JS-1 well and within the same title (WA-5-L). It was originally undertaken in 2019 and reprocessed later in 2019 using NOPSEMA's contemporary modelling thresholds. The largest tank of the vessel proposed for the JS-1 Well Intervention activity is also 2000 m^3. Given that spill parameters and geographic location fall within the envelope of the existing MDO modelling, it is an appropriate surrogate and therefore additional modelling was not required.

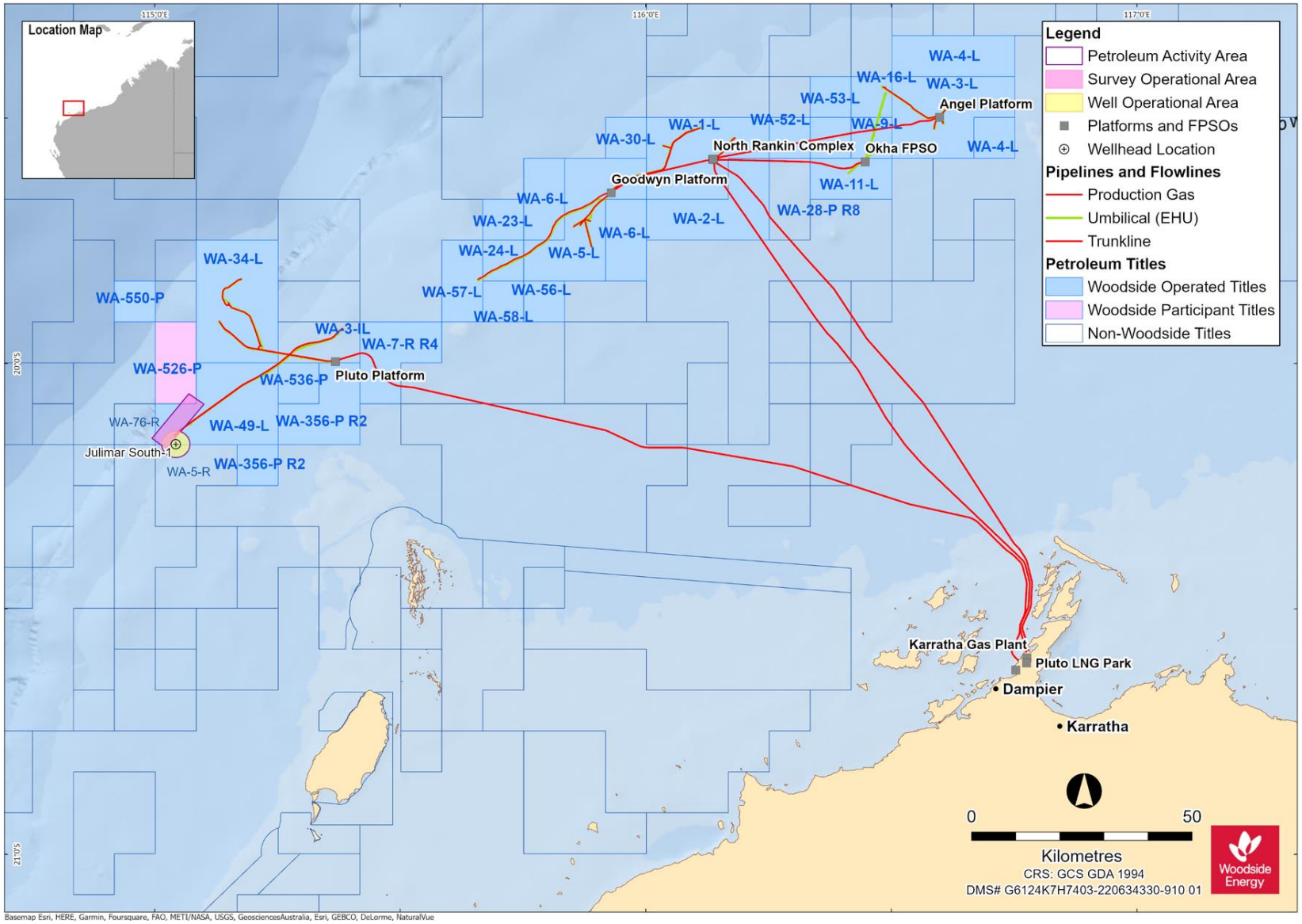


Figure 2-3: Location of Julimar Appraisal Drilling and Surveys PAP

2.2.1 Hydrocarbon characteristics

More detailed hydrocarbon characteristics, including modelled weathering data and ecotoxicity, are included in Section 6 of the EP.

Julimar condensate

Julimar Condensate (API 45.7) (reference oil JULA-04, 2020) is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 43.6% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); up to a further 22.9% could evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 27.1% should evaporate over several days (265 °C < BP < 380 °C). Approximately 6.5% 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.

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 (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%.

If released in the marine environment and in contact with the atmosphere (i.e. surface spill), approximately 41% by mass of this oil is predicted to evaporate over the first couple of days depending upon the prevailing conditions, with further evaporation slowing over time. The heavier (low volatility) components of the oil have a tendency to entrain into the upper water column due to wind-generated waves but can subsequently resurface if wind-waves abate. Therefore, the heavier components of this oil can remain entrained or on the sea surface for an extended period, with associated potential for dissolution of the soluble aromatic fraction.

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 that there is a degree of uncertainty related to the use of modelling data and has subsequently utilised conservative approaches to volumes, weathering, spatial areas, timing and response effectiveness to scale capability to need.

The Oil Spill Model and Response System (OILMAP) and Integrated Oil Spill Impact Model System (SIMAP) models are both used for stochastic and deterministic trajectory modelling. They have been developed over three decades of planning, exercises, actual responses, several peer reviews, and validation studies. OILMAP was originally derived from the United States Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Type A model (French et al. 1996), for assessing marine transport, biological impact and economic damage that was also used under the United States Oil Pollution Act 1990 Natural Resource Damage Assessment (NRDA) regulations. Notable spills where the model has been used and validated against actual field observations include, Exxon Valdez (French McCay 2004), North Cape Oil Spill (French McCay 2003), along with an assessment of 20 other spills (French McCay and Rowe, 2004). In addition, test spills designed to verify fate, weathering and movement algorithms have been conducted regularly and in a range of climate conditions (French and Rines 1997; French et al. 1997; Payne et al. 2007; French McCay et al. 2007).

Further to this, the algorithms have been updated using the latest findings from the Macondo/Deepwater Horizon well blowout in the Gulf of Mexico and validated according to the Deepwater Horizon (DWH) oil spill in support of the NRDA (Spaulding et al. 2015; French McCay et

al. 2015, 2016). Finally, the OILMAP and SIMAP models have been used extensively in Australia to prosecute pollution offences, predict discharge locations and likely spill volumes based on weathering and surveillance observations, and has been used as expert witness evidence in Australian court proceedings, aiding the prosecution to determine spill quantum estimates.

2.3.1 Stochastic modelling

Quantitative, stochastic assessments have been undertaken for CS-01 and CS-02 (Table 2-1) to help assess the environmental consequences of a hydrocarbon spill.

A total of 100 replicate simulations were completed for CS-01 and 200 for CS-02 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 commencing within each calendar 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 contact 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

	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

Deterministic modelling is undertaken where initial stochastic modelling has indicated floating oil is present at an impact threshold of 50 g/m^2 and/or where there is shoreline accumulations at an impact threshold of 100 g/m^2. The deterministic modelling outputs are then used to scale the required capability for the offshore (containment and recovery and dispersant) and/or shoreline responses.

The stochastic modelling undertaken for both CS-01 and CS-02 does not predict any floating or shoreline oil at these thresholds thus deterministic modelling was not undertaken, and stochastic modelling has been used to scale the response.

Woodside is committed to a realistic, scalable response capability that is commensurate to the level of risk and able to be practically implemented and feasibly sustained.

2.3.3 Response planning thresholds for surface and shoreline hydrocarbon exposure

Thresholds to determine the EMBA are used to predict and assess environmental impacts and inform the Scientific Monitoring Program (SMP), however they do not appropriately represent the thresholds

at which an effective response can be implemented. Additional response thresholds are used for response planning and to determine areas where response techniques would be most effective. The deterministic modelling is then used to assess the nature and scale of a response.

In the event of an actual response, existing deterministic modelling would be reviewed for suitability and additional modelling would be conducted using real-time data and field information to inform IMT decisions.

The deterministic spill modelling outputs are presented at response planning thresholds for surface hydrocarbons for the WCCS. Surface spill concentrations are expressed as grams per square metre (g/m^2) (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 2-3: 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[5]	Code 3 – Dull metallic colours	5 to 50
50	Predicted minimum floating oil threshold for containment and recovery and surface dispersant application [6]	Code 4 – Discontinuous true oil colour	50 to 200
100	Predicted optimum floating oil threshold for containment and recovery and surface dispersant application	Code 5 – Continuous true oil colour	>200
Shoreline hydrocarbon threshold (g/m^2)	**Description**	**National Plan Guidance on Oil Contaminated Foreshores**	**Mass per area (m^3/km^2)**
100	Predicted minimum shoreline accumulation threshold for shoreline assessment operations	Stain	>100
250	Predicted minimum threshold for commencing shoreline clean-up operations	Level 3 – Thin Coating	200 to 1000

The surface thickness of oil at which dispersants are typically effective is approximately 100 g/m^2. However, substantial variations occur in the thickness of the oil within the slick, and most fresh crude oils spread within a few hours, so overall the average thickness is 0.1 mm (or approx. 100 g/m^2) (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.

[5] 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.

[6] 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.

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) 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 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 50g/m^2 was chosen as an average/equilibrium thickness for offshore response operations (50 g/m^2 is an average of 50% coverage of 0.1mm Bonn Agreement Code 4 – discontinuous true oil colour, or 25% coverage of 0.2mm Bonn Agreement Code 5 – continuous true oil colour which would represent small patches of thick oil or wind-rows).

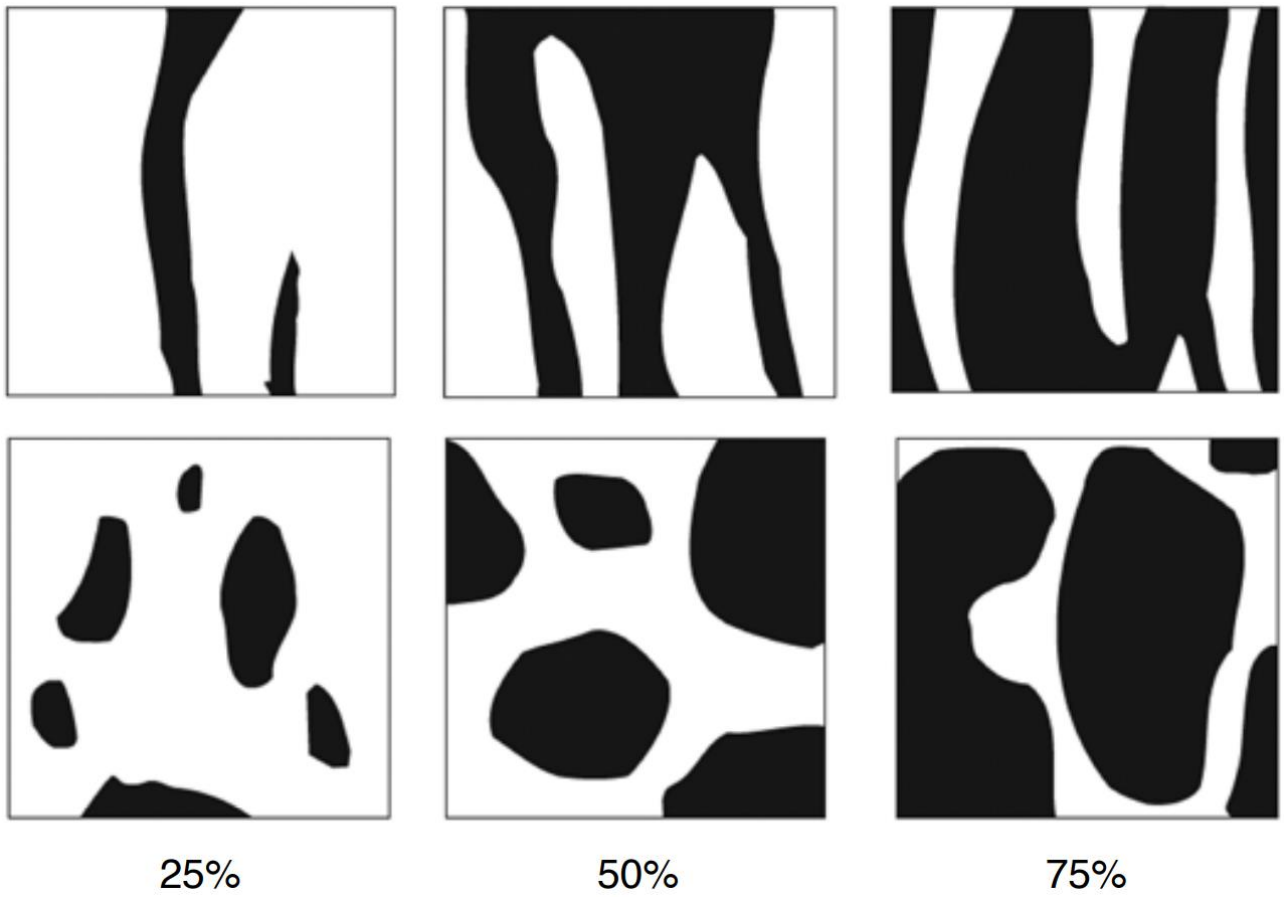


Figure 2-4: Proportion of total area coverage (AMSA, 2014)

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.

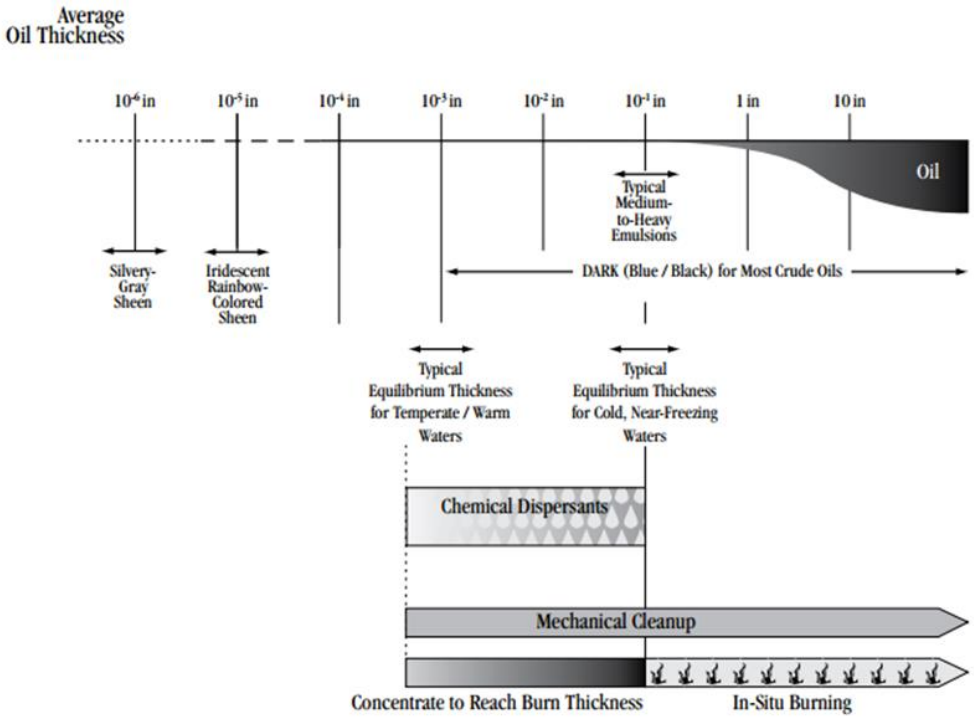


Figure 2-5: Oil thickness versus potential response options (from Allen & Dale 1996)

Wind and waves influence the feasibility of mechanical clean-up operations, dropping the effectiveness significantly because of entrainment and/or splash-over as short period waves develop beyond two to three feet (0.6 to 0.9 m) in height. Waves and wind can also be limiting factors for the safe operation of vessels and aircraft.

2.3.3.2 Surface hydrocarbon viscosity

Table 2-4: Surface hydrocarbon viscosity thresholds

Surface viscosity threshold (cSt)	Description	European Maritime Safety Authority (EMSA)	Viscosity at sea temperature (cSt)
5,000*	Predicted optimum viscosity for surface dispersant operations	Generally possible to disperse	500-5,000
15,000*	Predicted maximum viscosity for effective surface dispersant operations	Sometimes possible to disperse	5,000-15,000

*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 1,000 or 2,000 mPa (1,000 – 2,000 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 2,000 or 5,000 mPa (2,000 – 5,000 cSt), could be applied to all oils.”

However, modern oil spill dispersants are generally effective up to an oil viscosity of 5,000 mPa (5,000 cSt) or more, and their performance gradually decreases with increasing viscosity; oils with a viscosity of more than 15,000 are in most cases, no longer dispersible. Guidance from EMSA (2012) also indicates that products with a range of 500 – 5,000 cSt at sea temperature are generally possible to disperse, while 5,000 – 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.

Neither CS-01 or CS-02 spill scenarios will reach the 15,000 cSt threshold for the duration of the spill.

2.3.4 Spill modelling results

The volumes as presented in Table 2-5 are the worst case volumes resulting from the stochastic modelling and have been used to determine appropriate level of response.

Table 2-5: Worst case credible scenario modelling results

Scenario description		
	CS-01: Hydrocarbon release caused by loss of well containment	**CS-02: Hydrocarbon release due to vessel collision**
Total volume released (m^3 in days) Refer to Section 2.2.1 for detailed hydrocarbon characteristics	Surface (5 days): ~3023 m^3 Subsea (72 days): ~51,497m^3 Total Volume (77 days[7]): ~54,520 m^3	Instantaneous release of ~2000 m^3 [8] of marine diesel
Residual volume remaining post-weathering (m^3)	6.5% residual component of 3543.8 m^3	5% residual component of 100 m^3
Location	Lat: 20° 09' 52.289°S Long: 115°02' 35.331°E	Lat: 20° 08' 53.554" S Long: 115° 02' 28.078" E
Modelling results		
Surface area of hydrocarbons (>50 g/m^2)	Deterministic modelling was not undertaken so spatial area information is not available. Surface hydrocarbon concentrations greater than 50 g/m^2 are not predicted at any RPA for the duration of the spill for this scenario.	Deterministic modelling was not undertaken so spatial area information is not available. Surface hydrocarbon concentrations greater than 50 g/m^2 may occur at Montebello Marine Park after 3 hours, however, offshore response techniques, i.e. containment and recovery, and surface dispersant application, are not considered appropriate for spills of MDO.
Surface area of hydrocarbons (>50 g/m^2 and <15,000 cSt)		
Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a concentration of 10 g/m^2)	*No contact at threshold*	Montebello Marine Park (3 hours)
Minimum time to commencement of hydrocarbon accumulation at any shoreline receptor (at a concentration of 100 g/m^2)	*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).	*No contact at threshold*	*No contact at threshold*
Maximum cumulative hydrocarbon volume accumulated across all shoreline receptors contacted by accumulated hydrocarbons (at a concentration of 100 g/m^2)	*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)	Montebello Marine Park (51 hours)	Montebello Marine Park (3 hours)
The full list of response protection areas (RPAs) predicted from modelling is available in Table 3-1		

[7] 77 days was the approximation upon which the credible spill assessment was performed. Subsequent calculations, during WOMP preparation, has reduced this to 61 days. Therefore, 61 days has been applied to the performance standards in Sections 5.2 and 6.2 of this document and utilised in the preparation of well construction WOMP and activity SCERP.

[8] Loss of marine vessel separation MDO modelling of 2000 m^3 was available close to the JULA-K well location, 2 km from JS-1 well and within the same title (WA-5-L). It was originally undertaken in 2019 and reprocessed later in 2019 using NOPSEMA's contemporary modelling thresholds. The largest tank of the vessel proposed for the JS-1 Well Intervention activity is also 2000 m^3. Given that spill parameters and geographic location fall within the envelope of the existing MDO modelling, it is an appropriate surrogate and therefore additional modelling was not required.

The stochastic modelling results for the WCCS have been used as the basis for response planning and are included in **Section 0.**

The stochastic modelling results for CS-01 are summarised as follows:

- Floating oil at any of the assessed thresholds is not predicted at any receptor for the duration of the spill.
- No shoreline receptors are predicted to be contacted by oil at response thresholds (>100 g/m^2). Fastest shoreline contact at 10 g/m^2 is at Barrow Island (7.3 days)
- Montebello Marine Park is predicted to receive fastest entrained oil concentrations at the 100 ppb threshold after 51 hours.
- Spreading and weathering of the surface oil occurs rapidly due to the loss of light, volatile components and the spreading. Dispersant application and containment and recovery are not appropriate for use as surface concentrations are not predicted reach minimum feasible response thresholds (>50 g/m^2).

The stochastic modelling results for CS-02 are summarised as follows:

- Floating oil at the 10 g/m^2 threshold is predicted at Montebello Marine Park (3 hours).
- 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).
- Montebello Marine Park is predicted to receive fastest entrained oil concentrations at the 100 ppb threshold after 3 hours.
- Spreading and weathering of the surface oil occurs rapidly due to the loss of light, volatile components and the spreading. Dispersant application and containment and recovery are not appropriate for use on spills of marine diesel due to these weathering characteristics.

3 IDENTIFY RESPONSE PROTECTION AREAS

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.

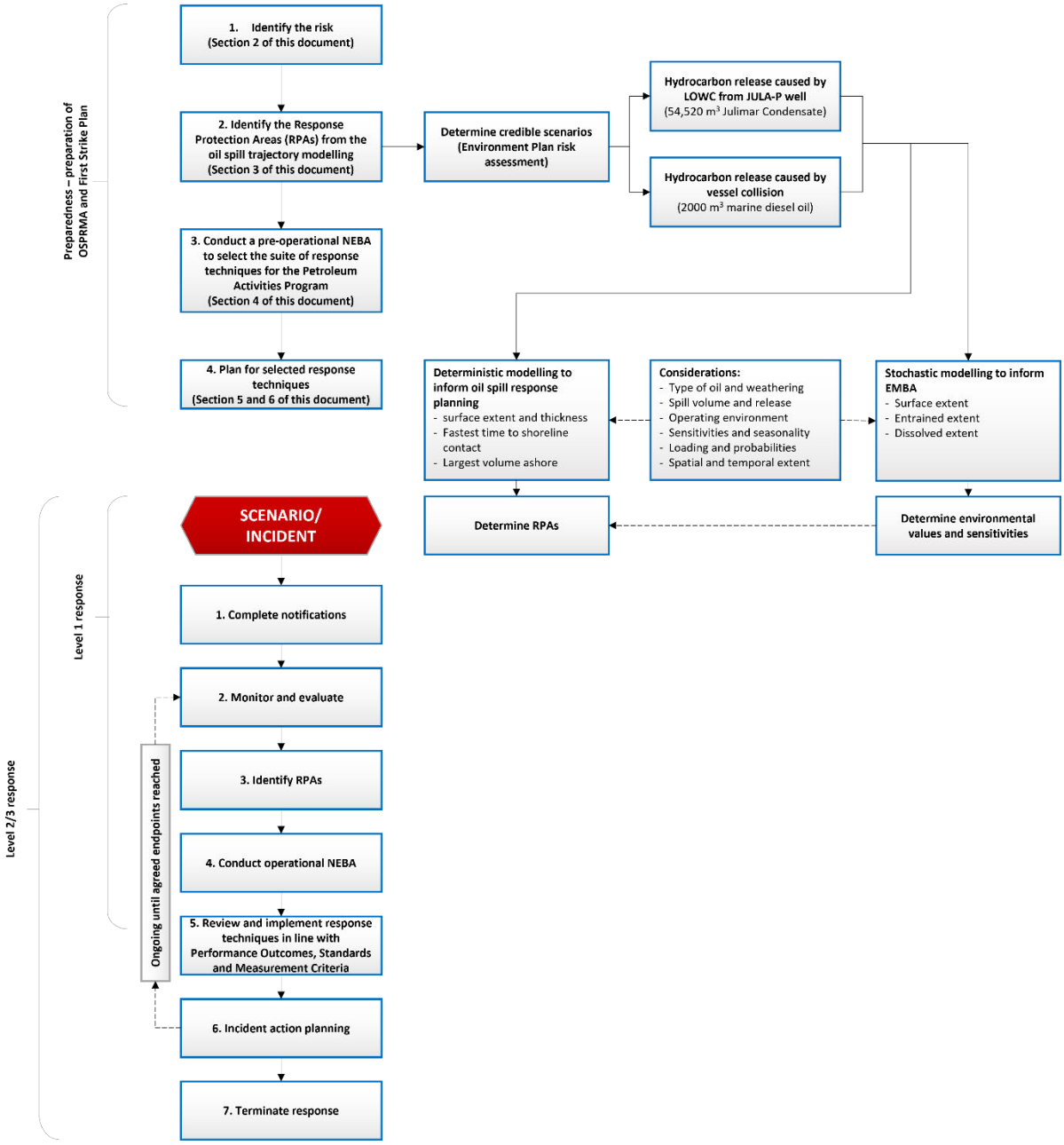


Figure 3-1: Identify Response Protection Areas flowchart

3.1 Identified sensitive receptor locations

Section 4 of the EP includes the list of sensitive receptor locations 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 for Conservation of Nature (IUCN) marine protected area categories
  - high conservation value habitat and species
  - important socio-economic/heritage value.

3.2 Identify Response Protection Areas

RPAs have been selected on the basis of their environmental ecological, social, economic, cultural and heritage values and sensitivities and the ability to conduct a response based on the minimum response thresholds (Section 2.3.3). 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 WCCS (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[9]) have been selected for response planning purposes. While not discounting other sensitivities, these RPAs have been used as the basis for demonstrating the capability to respond to the nature and scale of a spill from the WCCS and prioritising response techniques.

Table 3-1 outlines locations which were identified from the modelling runs for the WCCS but does not constitute the full list of RPAs potentially contacted from stochastic modelling (as per EMBA definition) (see Section 4 of the EP). Other RPA outliers were identified from the modelling and have been included in the assessment of capability in Sections 5 and 6.

Additional sensitive receptors are presented the existing environment description (Section 4 of the EP) and impact assessment section (Section 6 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. The RPAs have been identified from stochastic modelling results.

[9] 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/or control of the incident passes to statutory authorities e.g. WA DoT or AMSA.

Table 3-1: Response Protection Areas (RPAs) from deterministic modelling

Areas of coastline contacted	Conservation status	IUCN protection category	Minimum time to shoreline contact (above 100 g/m^2) in days [10]	Maximum shoreline accumulation (above 100 g/m^2) in m^3 [11]	Minimum time to shoreline contact (above 100 g/m^2) in days [12]	Maximum shoreline accumulation (above 100 g/m^2) in m^3 [13]
			CS-01		CS-02	
Barrow Island	Barrow Island Marine Park Barrow Island Marine Management Area Class A Nature Reserve	IUCN IA – Strict Nature Reserve IUCN VI – Multiple Use Zone IUCN IV – Recreational Use Zone	*No contact at threshold.* *10 g/m^2 contact after 7.3 days (5 m^3)*	*No contact at threshold.* *10 g/m^2 contact of 5 m^3 (7.3 days)*	*No contact at threshold.*	*No contact at threshold.*
Boodie Island, Double Island, and Middle Islands Nature Reserve	Nature Reserve (not Class A)	Unknown	*No contact at threshold.* *10 g/m^2 contact after 7.6 days (3 m^3)*	*No contact at threshold.* *10 g/m^2 contact of 3 m^3 (7.6 days)*	*No contact at threshold.*	*No contact at threshold.*
Hermite Island, and Montebello Islands and Marine Park	State Marine Park Australian Marine Park	IUCN IA – Strict Nature Reserve IUCN VI – Multiple Use Zone IUCN II and IV – Recreational Use Zone IUCN II – Marine National Park Zone	*No contact at threshold.* *10 g/m^2 contact after 12.6 days (6 m^3)*	*No contact at threshold.* *10 g/m^2 contact of 6 m^3 (12.6 days)*	*No contact at threshold.*	*No contact at threshold.*
Lowendal Islands	State Marine Park	IUCN VI – Multiple Use Zone	*No contact at threshold.*	*No contact at threshold.*	*No contact at threshold.*	*No contact at threshold.*

[10] This volume and time represent the first time to contact on defined shoreline polygon and the maximum volume ashore for that 24 hour period.
[11] This volume and time represent the maximum volume ashore on defined shoreline polygon for any 24 hour time period
[12] This volume and time represent the first time to contact on defined shoreline polygon and the maximum volume ashore for that 24 hour period.
[13] This volume and time represent the maximum volume ashore on defined shoreline polygon for any 24 hour time period

Areas of coastline contacted	Conservation status	IUCN protection category	Minimum time to shoreline contact (above 100 g/m^2) in days (10)	Maximum shoreline accumulation (above 100 g/m^2) in m^3 (11)	Minimum time to shoreline contact (above 100 g/m^2) in days (12)	Maximum shoreline accumulation (above 100 g/m^2) in m^3 (13)
			CS-01		CS-02	
			10 g/m^2 contact after 19.4 days (2 m^3)	*10 g/m^2 contact of 2 m^3 (19.4 days)*		
Middle Pilbara – Islands and Shoreline, Muiron Islands and MMA, Passage Islands, and North Sandy Island Nature Reserve	Muiron Islands Marine Management Area	IUCN IA – Strict Nature Reserve IUCN VI – Multiple Use Zone	*No contact at threshold.* *10 g/m^2 contact after 26 days (2 m^3)*	*No contact at threshold.* *10 g/m^2 contact of 2 m^3 (26 days)*	*No contact at threshold.*	*No contact at threshold.*
Southern Pilbara – Islands, and Airlie Island	State Marine Park Australian Marine Park	IUCN IV – Recreational Use Zone (AMP) IUCN II – Marine National Park Zone	*No contact at threshold.* *10 g/m^2 contact after 30 days (2 m^3)*	*No contact at threshold.* *10 g/m^2 contact of 2 m^3 (30 days)*	*No contact at threshold.*	*No contact at threshold.*
Exmouth, Ningaloo Coast World Heritage Area and State Marine Park, and Cape Range	World Heritage Area Australian Marine Park State Marine Park	IUCN II – National Park Zone IUCN IV – Recreational Use Zone	*No contact at threshold.* *10 g/m^2 contact after 35.6 days (7 m^3)*	*No contact at threshold.* *10 g/m^2 contact of 7 m^3 (35.6 days)*	*No contact at threshold.*	*No contact at threshold.*

4 NET ENVIRONMENTAL BENEFIT ANALYSIS

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.

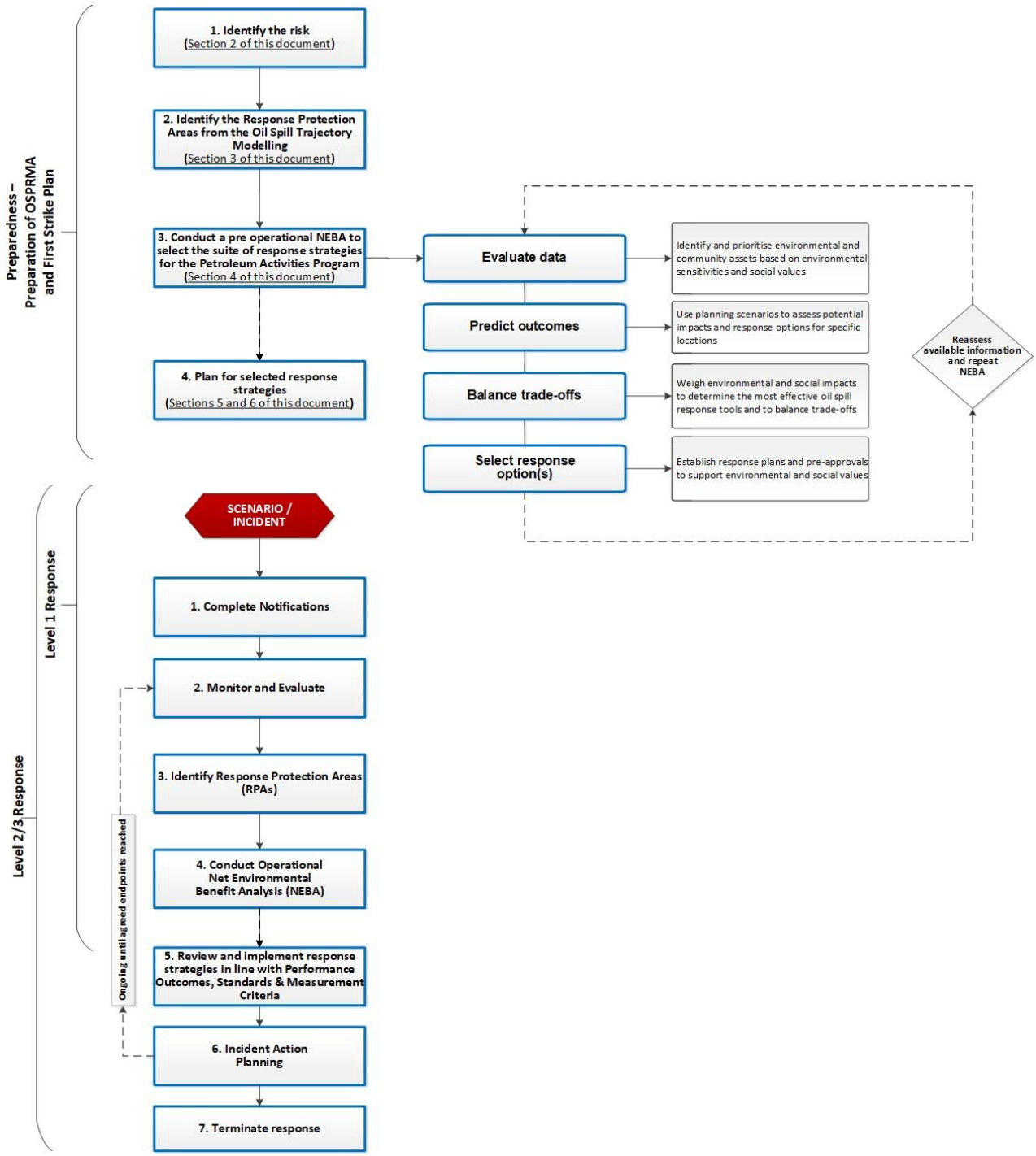


Figure 4-1: Net Environmental Benefit Analysis (NEBA) flowchart

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: Net Environmental Benefit Analysis detailed outcomes.

4.2 Stage 1: Evaluate data

Woodside identifies and prioritises environmental and community assets based on environmental sensitivities and social values, informed 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 2-5** 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 (ANNEX A: Net Environmental Benefit Analysis detailed outcomes).

4.5 Stage 4: Select Best Response Options

To select the response technique, all the other stages in the NEBA process are considered and used to establish response plans and any pre-approvals to support protection of identified environmental and social values.

The response techniques implemented may vary according to a particular spill. The hydrocarbon type released and the sensitivities of the receptors (both ecological and socio-economic) may influence the response. The pre-operational NEBA broadly evaluates each response technique and supports decisions on whether they are feasible and of net environmental benefit. Response techniques that are not feasible or beneficial are rejected at this stage and not progressed to planning.

Further risks and impacts from implementing these selected response options are outlined in Section 7.

4.5.1 Determining potential response options

The available response techniques based on current technology can be summarised under the following headings:

- operational monitoring
- source control
  - remotely operated vehicle (ROV) intervention
  - debris clearance and/or removal
  - capping stack
  - relief well drilling
- source control on the vessel
- 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
- oiled wildlife response.

Support functions may include:

- waste management
- post spill monitoring/ scientific monitoring.

Table 4 3 and Table 4 4 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 – Julimar Condensate release from loss of well containment (CS-01)

Response technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Julimar Condensate (JULA-04)				
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 Julimar 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	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 operations, 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 (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.	In the event of a potential loss of well containment conventional/ vertical capping stack deployment with a heavy lift vessel will be attempted if plume radius is ~25 m and environmental conditions permit. The use of a proven subsea deployment method such as a heavy lift vessel, which is more commonly used in industry, is a more reliable and, in turn, ALARP approach. 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 might also be made to meet response time frames.	**Yes**	Conventional/vertical capping stack deployment with a heavy lift vessel may be attempted if plume radius is ~25 m and environmental conditions permit (wind speed, wave height, current and plume radius).
Source control via relief well drilling	A subsea release of condensate will be over approximately 77 days[14]. Relief well drilling will be the primary option to stop the release.	For a spill from the JS-1 well, relief well drilling may be a feasible means of controlling of well containment event. Relief well drilling is a widely accepted and utilised technique.	**Yes**	Relief well drilling is likely to be the main technique employed to control a loss of well containment event.
Subsea Dispersant Injection (SSDI)	Application of subsea dispersant may reduce the scale and extent of hydrocarbons reaching the surface and thus may reduce spill volumes contacting predicted RPAs and/or reduce the plume size to facilitate access to the wellhead.	The goal of SSDI is to decrease the volume of oil that rises to the water surface and to reduce exposure to floating and entrained/dissolved oil. Based on the modelling analysis, it is predicted that there would be minimal floating hydrocarbons at the >10 g/m^2 threshold and that 5 m^3 of shoreline accumulation (at 10 g/m^2 threshold) would potentially occur 7	No	Due to the minimal surface and shoreline exposure predicted at RPAs, together with this technique not being required to facilitate other source control techniques, the use of SSDI is not deemed appropriate. The application of subsea dispersant would unnecessarily introduce additional chemical substances to the marine environment and further

[14] 77 days was the approximation upon which the credible spill assessment was performed. Subsequent calculations, during WOMP preparation, has reduced this to 61 days. Therefore, 61 days has been applied to the performance standards in Sections 5.2 and 6.2 of this document and utilised in the preparation of well construction WOMP and activity SCERP.

Response technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Julimar Condensate (JULA-04)				
	SSDI can increase dispersed/entrained hydrocarbons which can potentially have higher toxicity to biota in shallow water than naturally dispersed hydrocarbons. Entrained oil could potentially impact on sensitive shallow-water receptors e.g. corals and fish, which may be otherwise unaffected. Entrained oil plume likely to be increased resulting in greater spatial extent of entrained oil.	days after the LOWC occurred, with six other shorelines contacted (up to a peak of 7 m^3 at 10 g/m^2). The use of SSDI would not be required in order to deploy a capping stack safely. Use of SSDI would therefore increase the complexity of SIMOPS operations around the wellhead and unnecessarily introduce additional chemical to the marine environment. Given the preceding information and that there is conflicting evidence on the efficacy of SSDI, despite the considerable amount of research and experimental work completed since the Deepwater Horizon spill (Quigg et al. 2021), the use of SSDI is considered unwarranted and would not provide net environmental or safety benefits for this scenario.		increase exposure of subsea ecosystems to entrained hydrocarbons.
Surface dispersant application	Application of surface dispersant would likely reduce the volumes of hydrocarbons contacting sensitive receptors. It has the potential to remove large volumes of oil from the surface that could cause secondary contamination of wildlife or shorelines. Dispersant can also enhance biodegradation and may reduce VOCs therefore reducing potential health and safety risk to responders.	Dispersants are not 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 thus providing no net benefit. The modelling undertaken predicts that a spill of Julimar Condensate (JULA-04) would be prone to rapid spreading and evaporation and will not reach the minimum threshold (>50 g/m^2) required for feasible dispersant application for the duration of the spill. The application of dispersant is thus deemed inappropriate. Furthermore, this technique may be prevented from being undertaken due to personnel safety issues arising from high local concentrations of atmospheric volatiles.	**No**	Due to the predicted behaviour of a surface spill, the use of surface dispersant would be unwarranted and could unnecessarily introduce additional chemical substances to the marine environment. The additional entrainment could 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. The decontamination of a vessel used for mechanical dispersion activities would result in additional quantities of oily waste requiring appropriate handling and treatment. Unlikely to be an effective technique of crude and may cause emulsification.	**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.	Use of in-situ burning as a response technique for Julimar Condensate is unfeasible as the minimum slick thickness cannot be attained due to rapid spreading and evaporation. There is a lack of equipment and trained personnel available in Australia, 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, this technique may be prevented from being undertaken due to personnel safety issues arising from predicted high local concentrations of atmospheric volatiles.	**No**	Julimar Condensate 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	The modelling undertaken predicts that a spill of Julimar Condensate (JULA-04) would be prone to rapid spreading and evaporation and will not reach the minimum threshold (>50 g/m^2) required for feasible	**No**	In addition to low effectiveness and potential safety issues from high local concentrations of atmospheric volatiles, the modelling results predict that a spill of

Response technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Julimar Condensate (JULA-04)				
	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.	containment and recovery operations for the duration of the spill. The use of containment and recovery is thus deemed inappropriate. In addition, this technique can have low effectiveness with on average, <10% of available oil contained and recovered. The largest operation ever mounted was during the Deepwater Horizon/Macondo which achieved an effectiveness of approximately 3-5%. Furthermore, this technique may be prevented from being undertaken due to personnel safety issues arising from high local concentrations of atmospheric volatiles.		Julimar condensate would not reach minimum feasible response thresholds and thus make containment and recovery an unsuitable response technique.
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 may be utilised to guide shoreline protection and deflection operations, in agreement with WA DoT (for Level 2/3 spills). The modelling undertaken predicts that a spill of Julimar Condensate (JULA-04) is unlikely to contact any shorelines at response threshold (>100 g/m^2). Seven receptors are predicted to be contacted at 10 g/m^2. The fastest of these is Barrow Island on day 7.3 (5 m^3). Protection strategies can be used for targeted protection of sensitive resources. Access to sensitive areas may cause more negative impact than benefit.	**Yes**	RPAs predicted to be contacted are based on modelling outputs and thus may differ under the prevailing conditions of a real event. If RPAs are deemed to be at risk, based on real-time modelling during a spill event, shoreline protection and deflection techniques may be employed to minimise hydrocarbon contact providing net environmental benefit.
Shoreline clean-up	Shoreline clean-up is an effective means of hydrocarbon removal from contaminated shorelines where coverage is at an optimum level of 250 g/m^2.	If real-time Operational Monitoring activities (OM01, OM02 and OM03) indicate hydrocarbons might contact shorelines, pre-emptive assessments of sensitive receptors at risk (OM04), shoreline assessments (OM05) and existing TRPs may be utilised to guide shoreline protection and deflection operations, in agreement with WA DoT (for Level 2/3 spills). The modelling undertaken predicts that a spill of Julimar Condensate (JULA-04) is unlikely to contact any shorelines at feasible clean-up thresholds (>100 g/m^2). Seven receptors are predicted to be contacted at 10 g/m^2. The fastest of these is Barrow Island on day 7.3 (5 m^3). 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.	**Potentially**	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. If feasible thresholds are present, removal of hydrocarbons may 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 response	Oiled wildlife response is an effective response technique for reducing the overall impact of a spill on wildlife. This is mostly achieved through hazing to prevent additional wildlife from being contaminated and through rehabilitation of those already subject to contamination.	In the event 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 Julimar Condensate spill, response options may be limited to hazing to ensure the safety of response personnel.	**Yes**	This technique may prevent impact to and/or treat oiled wildlife providing net environmental benefit.

Table 4-2: Response technique evaluation – Vessel Collision: Installation Vessel and Fuel Tanker (CS-02)

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 marine diesel spill is a feasible response technique and outputs will be used to guide decision making on the use of other monitoring/response techniques and providing information to regulatory agencies including AMSA and WA DoT. Practicable techniques that could be used for this scenario include predictive modelling (OM01), surveillance and reconnaissance OM02) and monitoring of hydrocarbon presence in water (OM03). Modelling does not predict impact of any shoreline receptors at threshold, however, pre-emptive assessment of sensitive receptors at risk (OM04) and monitoring of contaminated resources (OM05) would be utilised if any sensitive shoreline receptors are deemed to be at risk of impact.	**Yes**	Monitoring the spill will be necessary to: • validate trajectory and weathering models • determine the behaviour of the oil in water • determine the location and state of the slick • provide forecasts of spill trajectory • determine appropriate response techniques • determine effectiveness of response techniques • confirm impact pathways to receptors • provide regulatory agencies with required information.
Source control via vessel SOPEP	Controlling the spill of diesel at source would be the most effective way to limit the quantity of hydrocarbon entering the marine environment.	A spill of diesel from a vessel collision will be instantaneous and source control will be limited to what the vessel or facility can safely achieve whilst responding to the incident.	**Yes**	Ability to stop the spill at source will be dependent upon the specific spill circumstances and whether or not it is safe for response personnel to access/isolate the source of the spill.
Surface dispersant application	Dispersants are not considered effective when applied on thin surface films such as marine diesel as the dispersant droplets tend to pass through the surface films without binding to the hydrocarbon resulting in the unnecessary addition of chemicals to the marine environment	Marine diesel is prone to rapid spreading and evaporation and is not suitable for surface dispersant application. Furthermore, whilst modelling predicts that floating oil may reach the required threshold (>50 g/m^2) for surface dispersant to be feasible at one RPA, use of dispersant on MDO is not deemed acceptable. The volatile nature of marine diesel is also likely to lead to unsafe conditions in the vicinity of fresh hydrocarbon thus this response technique is deemed inappropriate.	**No**	The application of dispersant to marine diesel is 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 un-impacted 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.	Use of in-situ burning as a response technique for marine diesel is unfeasible as the minimum slick thickness cannot be attained due to rapid spreading.	**No**	Diesel characteristics are not appropriate for the use of in-situ burning and would unnecessarily cause an increase the release of atmospheric pollutants.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: MDO				
		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.		
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.	Marine diesel is prone to rapid spreading and evaporation and is deemed unsuitable for effective containment and recovery operations. Furthermore, whilst modelling predicts that floating oil may reach the required threshold (>50 g/m^2) for surface dispersant to be feasible at one RPA, corralling volatile hydrocarbons such as MDO is deemed unsafe.	**No**	Containment and recovery would be an inappropriate response technique for a spill of marine diesel. 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 marine diesel 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 marine diesel 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 marine diesel 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 marine diesel is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon. Operational monitoring will, however, be deployed from the outset of a spill to track the spill location and fate in real-time.	**No**	In addition to safety issues, the modelling undertaken predicts that no shoreline receptors would be contacted by floating oil concentrations at a recoverable threshold and a spill of marine diesel is unlikely to accumulate at concentrations appropriate for shoreline clean-up techniques.
Oiled wildlife response	Oiled wildlife response is an effective response technique for reducing the overall impact of a spill on wildlife. This is mostly achieved through hazing to prevent additional wildlife from being contaminated and through rehabilitation of those already subject to contamination.	Due to the likely volatile atmospheric conditions surrounding a diesel spill, response options may be limited to hazing to ensure the safety of response personnel. The modelling undertaken predicts that no sensitive areas will be impacted thus it is unlikely that this technique would be required. 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 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, 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
    - 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: Net Environmental Benefit Analysis detailed outcomes.

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 operational 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 Exmouth, Onslow and Dampier to the spill event location means that multiple logistical options are available to monitor the spill in relatively short timeframes. The primary mobilisation base for initial monitoring activities would be Dampier. However, in the event of an extended spill with potential to impact receptors further afield, monitoring activities may also be mobilised from Exmouth, Onslow and Broome.

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.
- No shoreline contact at >100 g/m^2 is predicted for either CS-01 or CS-02.
- Fastest shoreline contact at >10 g/m^2 is predicted at 7.3 days at Barrow Island (CS-01).
- The shortest time to contact for oil at concentrations of entrained hydrocarbons greater than 100 ppb at shoreline receptors is at Montebello Marine Park within 51 hours (CS-01) and 3 hours (CS-02).
- Arrangements for support organisations who provide specialist services or resources should be tested regularly.

- Plans, procedures and support documents need to be in place for Operational and Support functions. These should be reviewed and updated regularly.
- The duration of the spill may be up to 77 days (CS-01) with potential clean-up operations continuing into Month 2.
- 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 COP daily to improve the accuracy of other operational monitoring strategies.	1, 3B, 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 strategies.	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 2 sorties per day, available for the duration of the response from day 1.	1, 3C, 4
		4.3	Observer to compile report during flight as per First Strike plan. Observers report available to the IMT within 2 hours of landing after each sortie.	1, 2, 3B, 4

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)**
		4.4	Unmanned Aerial Vehicles/Systems (UAV/UASs) to support Shoreline Clean-up 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 predicted impact, 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 predicted impact, in agreement with WA DoT (for Level 2/3 incidents), deployment of 1 specialist(s) in 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
		7.3	Shoreline access route 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.
- 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 clearly disproportionate to the environmental benefit gained and/or not reasonably practicable for this PAP.

The operational monitoring capability outlined in this section is part of the response developed to manage potential risks and impacts associated with the scenarios to ALARP, and there are no further additional, alternative and improved control measures other than those implemented that would provide further benefit.

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 Julimar water depth (163 m), therefore a moored MODU would be required and has been used as the basis for the analysis within this document.

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 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:
  - a relief well is drilled and first attempt at well kill within ~61 days[15]
  - a capping stack is in place (only feasible for an event with a plume radius of ~25 m).
- Arrangements for support organisations who provide specialist services or resources should be tested regularly.
- Plans, procedures and support documents need to be in place for Operational and Support functions. These should be reviewed and updated regularly.
- The duration of the spill may be up to ~61 days with response operations extending into Month 2. This is due to a modelled impact on Day 35.6 of 7 m^3 which WEL has the capacity to clean up within 1 day.

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.

[15] The 61-day duration for drilling of a relief well stated within this section is based upon the most recent studies undertaken during the drafting of the WOMP and activity SCERP.

Table 5-3: Response Planning Assumptions – Source Control

Response planning assumptions	
Safety considerations	Source control operations cannot be implemented if the safety of response personnel cannot be guaranteed. This requires an initial and ongoing risk assessment of health and safety hazards and risks at the site, in accordance with the Woodside Management System (WMS). Personnel safety issues may include: • hydrocarbon gas and/or liquid exposure • high winds, waves and/or sea states • high ambient temperatures.
Feasibility considerations	Woodside's primary source control option would be ROV intervention and relief well drilling for the JS-1 well. Capping stack may be viable where a loss of well containment occurs with a plume radius is ~25 m. 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; and • 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 150 T in shallower waters and 250 T in deeper waters • at least 90 m in length • deck has water/electricity supply • deck capacity to hold at least 110 T of capping stack.	1, 3B, 3C
		9.3	Identify source control vessel availability within 24 hours and begin contracting process. Vessel mobilised to site for deployment within 16 days for conventional capping.	1, 3B, 3C
		9.4	ROV available on MODU ready for deployment within 48 hours to attempt initial BOP well intervention.	1, 3B, 3C
		9.5	Hot Stab and/or well intervention attempt made using ROV and SFRT within 11 days.	1, 3B, 3C
		9.6	Capping stack on suitable vessel mobilised to site within 16 days. Deployment and well intervention attempt will be made once plume size is acceptable and safety and metocean conditions are suitable.	1, 3C
		9.7	Wild Well Control Inc (WWCI) staff available all year round to assist with the mobilisation, deployment, and operation of the capping stack and well intervention equipment.	1, 3B, 3C
		9.8	MODU mobilised to site for relief well drilling within 21 days.	1, 3C
		9.9	First well kill attempt completed within 61 days[16].	1, 3B, 3C
		9.10	Open communication line(s) to be maintained between IMT and infield operations to ensure awareness of progress against plan(s).	1, 3A, 3B
		9.11	Relief Well Peer review undertaken during well design which includes screening and identification of suitable	1, 3C

[16] The 61-day duration for drilling of a relief well stated within this section is based upon the most recent studies undertaken during the drafting of the WOMP and activity SCERP.

Environmental Performance Outcome		To stop the flow of hydrocarbons into the marine environment.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
			MODU(s) with in-force Australian safety cases for relief well drilling.	
		9.12	Monthly monitoring of the availability of MODUs through existing market intelligence including current Safety Case history, to meet specifications for relief well drilling. Titleholders of suitable MODUs notified.	3C
		9.13	Prior to entering the reservoir, reconfirm that pre-identified/screened MODU(s) remain available for relief well drilling and engage titleholder.	1, 3C
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
		11.4	Prior to reservoir intersect, Woodside will prepare a safety case revision and present to NOPSEMA to aid in establishing representative timeframes for approval.	1, 3C

The resulting source control capability has been assessed against the WCCS. The range of techniques provide a feasible and viable approach to well intervention and 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 clearly 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 [17], 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 marine diesel 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 of the EP**. The vessel master's roles and responsibilities are described in **Section 7 of the EP**.

Performance standards for each contracted PAP vessel are detailed in the vessel's specific SOPEP.

These standards ensure sufficient resources are available and are adequately tested to ensure implementation of the SOPEP in the event of a hydrocarbon spill.

[17] Marpol 73/78 Annex I entry into force in Australia, 2 Oct 1983

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 permit safe deployment of protection and deflection measures.
- Oil trajectory has been identified as heading towards identified RPAs.

5.4.1 Response need based on predicted consequence parameters

The following statements identify the key parameters upon which the response need can be based:

- 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.
- No shoreline contact at >100 g/m^2 is predicted for either CS-01 or CS-02.
- Fastest shoreline contact at >10 g/m^2 is predicted at 7.3 days at Barrow Island (CS-01).
- The duration of the spill may be up to 77 days (CS-01) with potential protection operations continuing into Month 2.
- Arrangements for support organisations who provide specialist services (trained personnel, protection and deflection equipment) and/or resources and should be tested regularly.
- Tactical Response Plans (TRPs) for Response Protection Areas (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.
- 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 2 RPAs by Day 7 (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	Equipment mobilised from closest stockpile 5 days prior to predicted impact.	1, 3A, 3C, 4
		13.2	Supplementary equipment mobilised from State, AMOSC, AMSA stockpiles 5 days prior to predicted impact.	1, 3C, 3D, 4
		13.3	Supplementary equipment mobilised from OSRL 5 days prior to predicted impact.	
		13.4	Woodside maintains integrated fleet of vessels. Additional vessels can be sourced through existing contracts/frame agreements	1, 3A, 3C, 4
14	Management of Environmental Impact of the response risks	14.1	If vessels are required for access, anchoring locations will be selected to minimise disturbance to benthic primary producer habitats. Where existing fixed anchoring points are not available, locations will be selected to minimise impact to nearshore benthic environments with a preference for areas of sandy seabed where they can be identified.	1

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 response threshold (>100 g/m^2) and shoreline contact at 10 g/m^2 is not predicted until day 7.3 (CS-01), the existing capability is considered sufficient to mobilise and deploy protection at RPAs prior to hydrocarbon contact, guided by the ongoing operational monitoring.
- The most significant constraint on expanding the scale of response operations is the availability of accommodation and transport services in the region between Exmouth and Port Hedland, and the management of response generated waste. From previous assessment of accommodation in this region, Woodside estimates that current accommodation can cater for a range of 500-700 personnel per day for an ongoing operation.
- TRPs have been developed for identified RPAs 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 6.4**.

5.5 Shoreline Clean-up

Shoreline clean-up may be undertaken using a broad range of techniques when floating hydrocarbons contact shorelines. The timing, location and extent of shoreline clean-up activities can vary from one scenario to another, depending on the hydrocarbon type, sensitivities and values contacted, shoreline type and access, degree of oiling, and area oiled.

Shoreline clean-up is typically undertaken as a three-phase process:

- Phase one (gross contamination removal) involving the collection of bulk oil, either floating against the shoreline or stranded on it.
- Phase two (moderate to heavy contamination removal) involving removal or in-situ treatment of shoreline substrates such as sand or pebble beaches.
- Phase three (final treatment or polishing) involving removal of the remaining residues of oil.

As phase one typically involves recovery of floating and pooled oil, and phase three removes minor volumes, they have not been considered in the assessment of response need for the scenarios identified.

The *Shoreline 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).

5.5.1 Response need based on predicted consequence parameters

The following statements identify the key parameters upon which the response need can be based:

- No shoreline contact at >100 g/m^2 is predicted for either CS-01 or CS-02.
- Fastest shoreline contact at >10 g/m^2 is predicted at 7.3 days at Barrow Island (CS-01).
- 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 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.
- The duration of the spill may be up to ~77 days (CS-01) with potential protection operations continuing into Month 2.

- 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.
- Tactical Response Plans (TRPs) for Response Protection Areas (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)	1 x 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, buckets, plastic bags etc.
Physical properties	**Surface Threshold for Response Planning** • 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. In the event of a real incident, operational monitoring will be undertaken from the outset of a spill whether or not these thresholds have been reached.
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 hr day is based on moderate to high coverage of oil (100 g/m^2–1,000 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.	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).

Sorbents	Sorbent boom or pads used to recover fluid or sticky hydrocarbons. Can also be used after manual clean-up to remove any residues from crevices or from vegetation.	When hydrocarbons are free-floating close to shore or stranded onshore. As a secondary treatment method after hydrocarbon removal and in sensitive areas where access is restricted.	Access for deploying and retrieving sorbents should not be through soft or sensitive habitats or affect wildlife.	Used for rocky shorelines. Sorbent boom will allow for deployment from small shallow draught vessels, which will allow deployment close to shore where water is sheltered and to aid recovery. Sorbents will create more solid waste compared with manual clean-up, so will be limited to cleaning rocky shorelines.
Vacuum recovery, flushing, washing	The use of high volumes of low-pressure water, pumping and/or vacuuming to remove floating hydrocarbons accumulated at shorelines.	Suited to rocky or pebble shores where flushing can remobilise hydrocarbons (to be broken up) and aid natural recovery. Any accessible shoreline type from land or water. May be mounted on barges for water-based operations, on trucks driven to the recovery area, or hand-carried to remote sites. Flushing and vacuum may be useful for rocky substrate. Medium- to high-energy shorelines where natural removal rates are moderate to high. Where flushed hydrocarbons can be recovered to prevent further oiling of shorelines.	Areas of pooled light, fresh hydrocarbons may not be recoverable via vacuum due to fire and explosion risks. Shorelines with limited access. Flushing and washing not recommended for loose sediments. High-energy shorelines where access is restricted.	High volume low pressure (HVLP) flushing and washing into a sorbent boom could be used for rocky substrate, if protection booming has been unsuccessful in deflecting hydrocarbons from these areas.

Sediment reworking	Movement of sediment to surf to allow hydrocarbons to be removed from the sediment and move sand via heavy machinery.	When hydrocarbons have penetrated below the surface. Recommended for pebble/cobble shoreline types. Medium- to high-energy shorelines where natural removal rates are moderate to high.	Low-energy shorelines as the movement of substrate will not accelerate the natural cleaning process. Areas used by fauna which could potentially be affected by remobilised hydrocarbons.	Use of wave action to clean sediment: appropriate for sandy beaches where light machinery is accessible.
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 (National Plan registered Oil Spill Cleaning Agent – '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 shorelines available for shorelines with predicted contact within 10 days	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 2 shoreline clean-up operations by Day 7	1, 2, 3A, 3C, 4
		15.7	In liaison with WA DoT (for Level 2/3 incidents), mobilise and deploy up to 1 shoreline clean-up operations by Week 3, 1 in Week 4 and 2 in Month 2.	
		15.8	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
		15.8	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
		15.9	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.	

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)**
		16.3	Supplementary equipment mobilised from State, AMOSC, AMSA stockpiles 5 days prior to predicted impact.	1, 3C, 3D, 4
		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	Removal of vegetation will be limited to moderately or heavily oiled vegetation.	
		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.

Modelling does not predict shoreline contact at 100 g/m^2 for the duration of the spill. The only shoreline contact is below feasible response thresholds (10 g/m^2) and is predicted from day 7.3 (Barrow Island, 5 m^3). Woodside is therefore satisfied that the current capability is managing risks and impacts to ALARP.

The capability available meets the need identified for this activity. The shoreline clean-up capability has the following expected performance (if required during a response):

- Woodside has the capacity to mobilise and deploy up to 1-2 shoreline clean-up teams (approx. 10-20 responders) by Day 7 using existing labour hire contracts with Woodside, AMOSC, Core Group, AMSA, WA DoT and OSRL team leads.
- Assessment of response capability indicates for a worst-case scenario the actual teams required would meet the available capability and the response would be completed by the end Month 2.
- 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 all identified RPAs excepting international locations.
- Woodside has assessed the existing capability available and considered potential alternative, additional and improved control measures. Where control measures have been selected and implemented, they are included in Section **6.5**.
- No further control measures that may result in an increased environmental benefit that involve moderate to significant cost and/or dedication of resources have been adopted as the limited scale and timeframe for deployment of this technique does not justify the excessive costs of identified alternate, improved or additional controls.

5.6 Oiled wildlife response

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 is required to take the role of 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 Biodiveristy, 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, and for level 2/3 spills, 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 (BC Act)*, which has provisions for authorising activities that affect wildlife.

For level 1 spills in State waters, Woodside is required to take the role of Control Agency, including for wildlife response. It is, however, also an expectation 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 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 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 priority 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 *Julimar Appraisal Drilling and Surveys Environment Plan*.

For WA, the Pilbara and Kimberley Regional Oiled Wildlife Plans (DBCA [formerly Department of Parks and Wildlife), 2014) provide useful information relating to wildlife priority response areas in their respective regions.

Table 5-10: Key at-risk species potentially in Priority Protection Areas and open ocean

Species	Open ocean	Montebello 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:

- Floating oil at >10 g/m^2 is predicted at Montebello Marine Park within 3 hours for CS-02.
- There is no predicted shoreline accumulation at response thresholds (>100 g/m^2).
- At sea there are likely to be low numbers of at risk or impacted wildlife, and limited opportunities to rescue wildlife, given the distribution and behaviour of animals in the open marine environment. At sea, continued wildlife reconnaissance, carcass recovery, sampling of carcasses that cannot be retrieved, and scientific monitoring are more likely to be the focus of response efforts.
- As the surface oil approaches shorelines and as oil accumulates on the shoreline, potential for oiled wildlife impacts are likely to increase as well as opportunities to rescue wildlife.
- It is estimated the wildlife impact would be between medium and high, as defined in the WAOWRP (DBCA, 2022a) (**Table 5-11)**.

Table 5-11: WAOWRP Guide for rating wildlife impact of an oil spill (DBCA, 2022)

Wildlife Impact Rating	Low	Medium	High
What is the likely duration of the wildlife response?	<3 days	3-10 days	>10 days
What is the likely total intake of animals?	<10	11-25	>25
What is the likely daily intake of animals?	0-2	2-5	>5
Are threatened species, or species protected by treaty, likely to be impacted, either directly or by pollution of habitat or breeding areas?	No	Yes – possible	Yes – likely
Is there likely to be a requirement for building primary care facility for treatment, cleaning and rehabilitation?	No	Yes – possible	Yes – likely

Tactics

Where there is imminent or actual impact to wildlife, Woodside will activate the Wildlife Division and follow the oiled wildlife incident management framework and implementation plan outlined in the Woodside *Oiled Wildlife Operational Plan*.

In Commonwealth waters, Woodside will be responsible for the planning and implementation of the OWR in its entirety. 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 is likely, requiring preventative actions and/or wildlife rescue, 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, along with capture, intake and treatment require a higher degree of planning, approval (licenses) and skills and will be planned for and carried out under the IAP as outlined in the *Oiled Wildlife Operational Plan* and in accordance with the WAOWRP (DBCA, 2022a) and WA OWR Manual (DBAC, 20022b).

The oiled wildlife response technique targets key wildlife populations at risk within Commonwealth open waters and the nearshore waters as described in **Section 4** of the EP.

5.6.2 Environmental performance based on need

Table 5-12: Environmental Performance – Oiled Wildlife Response

Environmental Performance Outcome		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** Error! Reference source not found.**)**
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 the wildlife response capability has the following expected performance:

- Undertake OWR first strike response including mobilisation of operational monitoring (OM01-05) to identify wildlife and RPAs contacted or at imminent risk of contact by hydrocarbons.
- Availability and mobilisation of trained OWR personnel to supervise OWR activities.
- Access to wildlife resources (personnel and equipment) to meet the needs where there are medium or high levels of wildlife impact.

5.7 Waste Management

Waste management is considered a support technique to shoreline clean-up and wildlife response. Waste generated and collected during the response that requires 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) – approx. 5-10 x multiplier for oily solid and liquid wastes generated by manual clean-up.
	Oiled wildlife response – approximately $1m^3$ of oily liquid waste generated for each wildlife unit cleaned.

5.7.2 Environmental performance based on need

Table 5-14: Environmental performance – waste management

Environmental Performance Outcome		To minimise further impacts, waste will be managed, tracked and disposed of in accordance with laws and regulations.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
22	Waste Management	22.1	Contract with waste management services for transport, removal, treatment and disposal of waste.	1, 3A, 3B, 3C, 4
		22.2	Access to at least 47-115 m^3 of solid and liquid waste storage available within 7 days upon activation of 3rd party contract.	
		22.3	Access to up to 312 m^3 by end of Month 2.	
		22.4	Recovered hydrocarbons and wastes will be transferred to licensed treatment facility for reprocessing or disposal.	
		22.5	Teams will segregate liquid and solid wastes at the earliest opportunity.	
		22.6	Waste management provider support staff available year-round to assist in the event of an incident with waste management as detailed in contract.	
		22.7	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
		22.8	Waste management to be conducted in accordance with Australian laws and regulations.	1, 3A, 3B, 3C, 4

The resulting waste management capability has been assessed against the WCCS. The range of techniques provide an ongoing approach to waste management at identified RPAs.

Given the largest shoreline volumes ashore are predicted during Week 5-6 at a maximum volume of 9 m^3, 312 m^3 of waste is expected across all shoreline clean-up operations (including oiled wildlife response). The capability available therefore exceeds the need identified.

It indicates the waste management capability has the following expected performance:

- Shoreline and nearshore operations may generate up to 312 m^3 over 2months of operations.
- Woodside has assessed the existing capability available and considered potential alternative, additional and improved control measures. Where control measures have been selected and implemented, they are included in **Section 6.7**.

Veolia Waste Management has a waste treatment capacity of approximately 120,000 m^3, at both Exmouth Port and King Bay supply base, thus the waste management requirements are within Woodside's and Veolia's existing capacity.

5.8 Scientific monitoring

A scientific monitoring program (SMP) would be activated following a Level 2 or 3 unplanned hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors. This would consider receptors at risk (ecological and socio-economic) for the entire predicted 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 are used to assess the environmental risk, in terms of delineating which areas of the marine environment are predicted to be exposed to hydrocarbons exceeding environmental threshold concentrations (refer to Table **2-2**, **Section 2.3.1.1**). The summary of all the locations where hydrocarbon thresholds could be exceeded by any of the simulations modelled is defined as the EMBA. The PAP worst-case credible spill scenarios (CS-01 and CS-02) define the EMBA and is the basis of the SMP approach presented in this section.

It should be noted the resulting SMP receptor locations may 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** Error! Reference source not found. – Operational monitoring) for the operational monitoring overview.

Key objectives of the Woodside oil spill scientific monitoring program are:

- Assess the extent, severity and persistence of the environmental impacts from the spill event;
  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 EPBC Act listed species, environmental values associated with protected areas and socio-economic values, such as fisheries. The ten SMPs are as follows:

- SM01 – Assessment of the presence, quantity and character of hydrocarbons in marine waters (linked to OM01 to OM03)
- SM02 – Assessment of the presence, quantity and character of hydrocarbons in marine sediments (linked to OM01 and OM05)
- SM03 – Assessment of impacts and recovery of subtidal and intertidal benthos
- SM04 – Assessment of impacts and recovery of mangroves/saltmarsh habitat
- SM05 – Assessment of impacts and recovery of seabird and shorebird populations
- SM06 – Assessment of impacts and recovery of nesting marine turtle populations
- SM07 – Assessment of impacts to pinniped colonies including haul-out site populations
- SM08 – Desktop assessment of impacts to other non-avian marine megafauna
- SM09 – Assessment of impacts and recovery of marine fish (linked to SM03)
- SM10 – Assessment of physiological impacts to important fish and shellfish species (fish health and seafood quality/safety) and recovery.

These SMPs have been designed to cover all key tropical and temperate habitats and species within Australian waters and broader, if required. A planning area for scientific monitoring is also identified to acknowledge potential hydrocarbon contact below the environmental

threshold concentrations and beyond the EMBA. This planning area has been set with reference to the entrained low exposure value of 10 ppb detailed in the NOPSEMA Bulletin #1 Oil Spill Modelling (2019), and for this activity is shown in Figure 5-1:

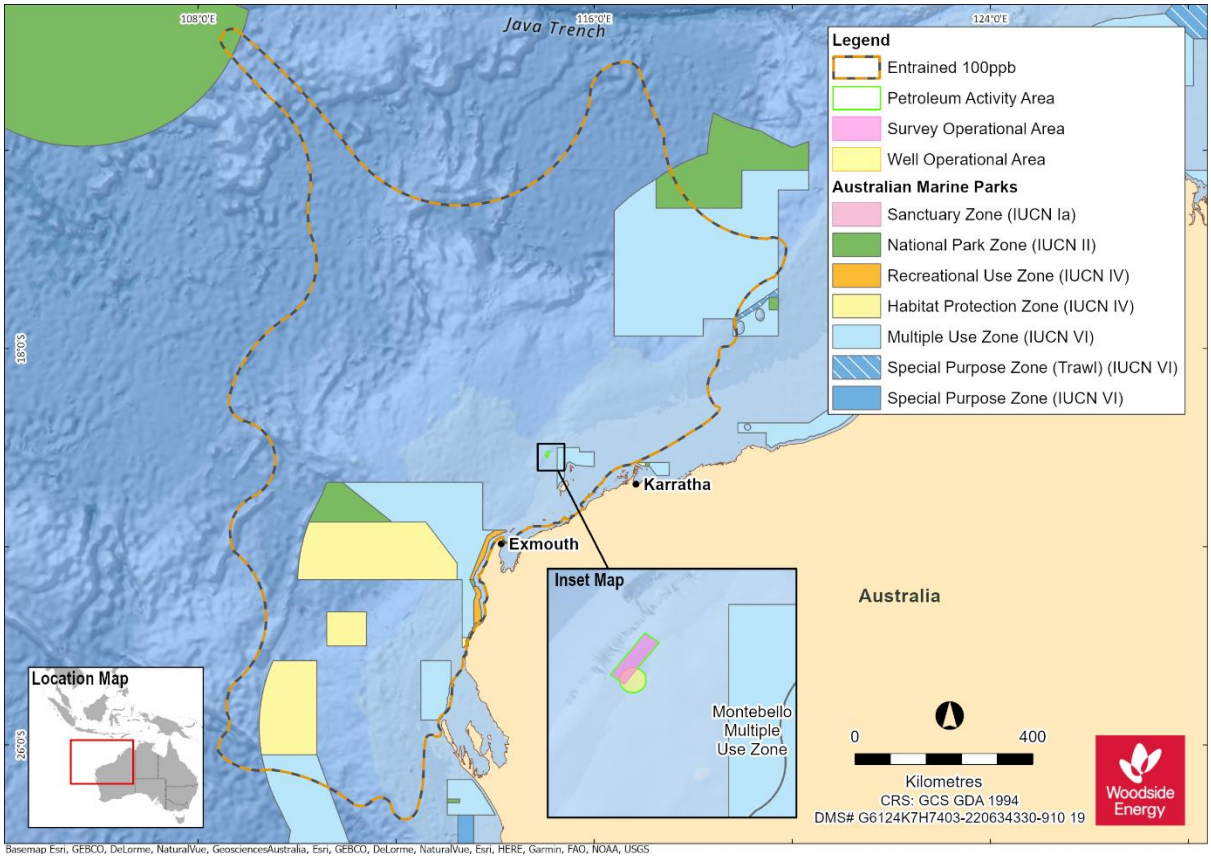


Figure 5-1:The planning area for scientific monitoring based on the area potentially contacted by the low (below ecological impact) entrained hydrocarbon threshold of 10 ppb in the event of the worst-case credible spill scenario (CS-01).

Please note that Figure 5-1 represents the overall combined extent of the oil spill model outputs based on a total of 100 replicate simulations over an annual period for CS-01 and therefore represents the largest spatial boundaries of 100 CS-01 hydrocarbon spill combinations, not the spatial extent of a single CS-01 hydrocarbon spill.

5.8.1 Scientific Monitoring Deployment Considerations

Table 5-15: Scientific monitoring deployment considerations

Scientific Monitoring Deployment Considerations	
Existing baseline studies for sensitive receptor locations predicted to be affected by a spill	PBAs of the following two categories: • PBAs within the predicted <10-day hydrocarbon contact time prediction: As part of this assessment, a desktop review was conducted of available and appropriate baseline data for key receptors for locations (if any) that are potentially impacted within 10 days of a spill (based on the EMBA). Furthermore, the need to conduct baseline data collection to address data gaps and demonstrate spill response preparedness is assessed (refer to ANNEX D). In the scenario that baseline data needs are identified, planning for baseline data acquisition is typically commenced pre-PAP and the execution of studies undertaken considers: receptor type, seasonality and temporal assessment requirements and location conditions. • PBAs predicted >10 days to hydrocarbon contact: As part of this assessment, a desktop review is conducted of available and appropriate baseline data for key receptors for locations (if any) that are potentially impacted >10 days' time of a hydrocarbon spill event and documented (refer to Section 5.11.2). In the event of a spill, the SMP activation (as per the Julimar Appraisal Oil Pollution First Strike Response Plan) directs the SMP team to follow the steps outlined in the SMP Operational Plan. The steps include: the review of availability and type of existing baseline data, with particular reference to any Pre-emptive Baseline Areas (PBAs) identified as >10 days to hydrocarbon contact as predicted by forecast modelling trajectories. 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 (refer to **Section 0**) and the process 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 are the identified limits for implementing 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

Table 5-16: Scientific monitoring response planning assumptions

Response Planning Assumptions	
PBAs	PBAs identified through the application of defined hydrocarbon impact thresholds during the Quantitative Spill Risk Assessment process and a consideration of the minimum time to contact at receptor locations fall into two categories: • PBAs for which baseline data exist or are planned for and data collection may commence pre-PAP (for locations identified as ≤ 10 days minimum time to contact). • PBAs (for locations > 10 days minimum time to contact) for which baseline data may be collected in the event of an unplanned hydrocarbon release. In the event of a spill, response phase PBAs are prioritized based on 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 activity. The PBAs for Julimar Appraisal Drilling and Surveys are identified and listed in ANNEX D, Table D-1. The listed PBAs, together with the situational awareness (provided by the operational monitoring) are the basis for the response phase SMP planning and implementation.
Pre-Spill	Activity: Julimar Appraisal Drilling and Surveys The worse case credible scenarios of hydrocarbon release for the activity have identified the following[18]: • Commonwealth marine environment[1] • Ningaloo Coast[19] • Barrow, Montebello and Lowendal Island groups (including State Marine Parks and Management Areas) • Southern Pilbara Island group • Rankin Bank. Refer to ANNEX D, Table D-2 – baseline data available. Australian Marine Parks (AMPs) potentially affected includes: • Gascoyne AMP • Ningaloo AMP • Montebello AMP All the Australian Marine Parks (AMPs) are located in offshore waters where hydrocarbon exposure is possible from floating hydrocarbons (on surface waters) and in the upper water column (0-20 m depth range, approximately).
In the Event of a Spill	Receptor locations with >10 days to hydrocarbon contact, as well as the wider area, will be investigated and identified by the SMP team (in the Environment Unit of the CIMT) as the spill event unfolds and as the situational awareness provided by the OMPs permits delineation of the spill affected area (for example, updates to the spill trajectory tracking).

[18] In the absence of minimum time to contact modelling results for entrained hydrocarbons a precautionary approach to the Pre-spill and in the event of a spill description of sensitive receptor location contacted by hydrocarbons is presented.

[19] Ningaloo Coast includes the WHA, State Marine Park

	To address the initial focus in a response phase SMP planning situation, receptor locations predicted to be contacted between >10 days have been identified as follows: • Muiron Islands • Shark Bay (AMP, WHA and State Marine Park) including the barrier islands of Bernier and Dorre. The unfolding spill affected area predictions and confirmation of appropriate baseline data will determine the selection of receptor locations and SMPs to be activated in order to gather pre-emptive (pre-hydrocarbon contact) data. Refer to ANNEX C for further details on the process for scientific monitoring plan implementation and delivery. The timing of SMP activation and mobilisation of the individual SMPs to undertake data collection will be decided and documented by the Woodside SMP team following the process outlined in the SMP Operational Plan. In the event key receptors within geographic locations potentially impacted after 10 days (following a spill event or commencement of the spill), a response phase SMP effort to collect baseline data would be addressed. SMP planning would assess where adequate and appropriate baseline data are not available and a response phase effort to collect baseline data for the following purposes: • 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 Julimar Appraisal Drilling and Surveys, priority would be focused on the Ningaloo Coast, south of the predicted minimum time to contact locations. • 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. • Collection of baseline data for receptors predicted to be outside the spill affected area so reference datasets for comparative analysis with impacted receptor types can be assessed post-spill.
Baseline Data	• A summary of the spill affected area and receptor locations as defined by the EMBA for the PAP (PAP) worse case credible spill scenarios is presented in Julimar Appraisal Drilling and Surveys EP (Section 7). • The key receptors at risk by location and corresponding SMPs based on the EMBA for the PAP are presented in ANNEX D, Table D-1, as per the worse case credible spill event scenarios. 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 types and locations. The status of baseline studies relevant to the PAP are tracked by Woodside through the maintenance of a SMP Environmental Baseline Database, as well as accessing external databases such as the Department of Water and Environmental Regulation (WA) Index of Marine Surveys for Assessment (IMSA)[1] (refer to ANNEX C).

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

[1] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

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 and Muiron Islands
- Shark Bay
- Ningaloo AMP
- Gascoyne AMP
- Montebello AMP

Documented baseline studies are available for certain sensitive receptor locations including the Ningaloo Coast (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 5-17: Environment Performance – 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 Health Safety Environment and Quality (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 has contracted SMP service provider to provide scientific personnel to resource a base capability of one team per SMP (SM01-SM10, see ANNEX C Table C-2) 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 contractor, 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.	• Hydrocarbon Spill Preparedness Team 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 functions to manage a loss of well control response. • SMP Team structure, interface with SMP standby contractor (standby	25.1	• Woodside has 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.

	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 incident management functions. 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 Response Plan (FSRP) • 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 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 provide awareness training on the activation and stand-up of the Scientific Monitoring Programme (SMP) for the SMP standby contractor. • Woodside co-ordinates an annual SMP arrangement testing exercise which the SMP standby contractor			
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	26.1	Woodside maintains standby SMP capability to mobilise equipment required to conduct scientific monitoring programs SM01 – SM10 (except desktop based SM08):	• Hydrocarbon Spill Preparedness Team Internal Control Environment tracks the quarterly review of the

	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 Standby SMP 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. Standby SMP contractor can also address equipment redundancy through either individual or multiple suppliers. MoUs are in place with marine sampling equipment suppliers and analytical laboratories (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.		• Equipment is sourced through the existing standby contract with Standby SMP standby contractor, as detailed within the SMP Implementation Plan.	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 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)[20] (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 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	**PBA baseline data acquisition in the response phase** If baseline data gaps are identified for PBAs that has predicted hydrocarbon contact (contact time >10 days), there will be a response phase effort to collect baseline data with priority in implementing SMPs 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 Function in	• Response SMP plan. • Woodside's online Incident Management System Records. • SMP component of the Incident Action Plan.

[20] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

			development of the IAP.	
		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. • 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 two or three 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 is both a control measure and a measurement criterion. 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 criterion, 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 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 persons/ organisations and government agencies as required. Depending on the type and scale of the incident either the CIMT Duty Manager (DM) or 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 the response techniques adopted at the time of EP/OPEP acceptance remain appropriate to reduce the consequences of the spill. This process verifies 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 OPEA. 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 ensure persons/ organisations are engaged during the spill response in accordance with internal standards. This process requires that Woodside will:

- Undertake all required notifications (including government notifications) for persons/ organisations in the region (identified in the FSP). This includes notification to mariners to communicate navigational hazards introduced through response equipment and personnel.
- Identify and engage with relevant persons/ organisations and continually assess and review.

5.9.4 Environmental performance based on need

Table 5-18: 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 strategies 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 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: • Woodside Crisis Management 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 ensure strategies 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: • Operations Duty Manager • Operations Coordinator • Deputy Operations Coordinator • Planning Coordinator • Logistics (materials, aviation, marine and support positions) • Management Support • Health and Safety Advisor • Environment Duty Manage • People Coordinator • Public Information Coordinator • Intelligence Coordinator • Finance Coordinator.	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 IAP and assist with the execution of that plan.	
		32.5	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 Duty Manager.	1, 2, 3B, 3C, 4

5.10 Measurement criteria for all response techniques

Woodside ensures compliance with environmental performance outcomes and standards through four primary mechanisms. The performance tables aforementioned 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 & 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 & 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 IAP process formally documents and communicated the:

- incident objectives;
- status of assets;
- operational period objectives;
- response techniques (defined during response planning); and
- 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 Security & Emergency Management Competency Dashboard

The Security & Emergency Management (S&EM) competency dashboard records the number of trained and competent responders available across Woodside, and some external providers, to participate in a response.

This number varies depending 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
- AMOSC core group
- AMOSC
- OSRL
- Marine Spill Response Corporation (MSRC)
- AMSA
- Woodside contracted workforce

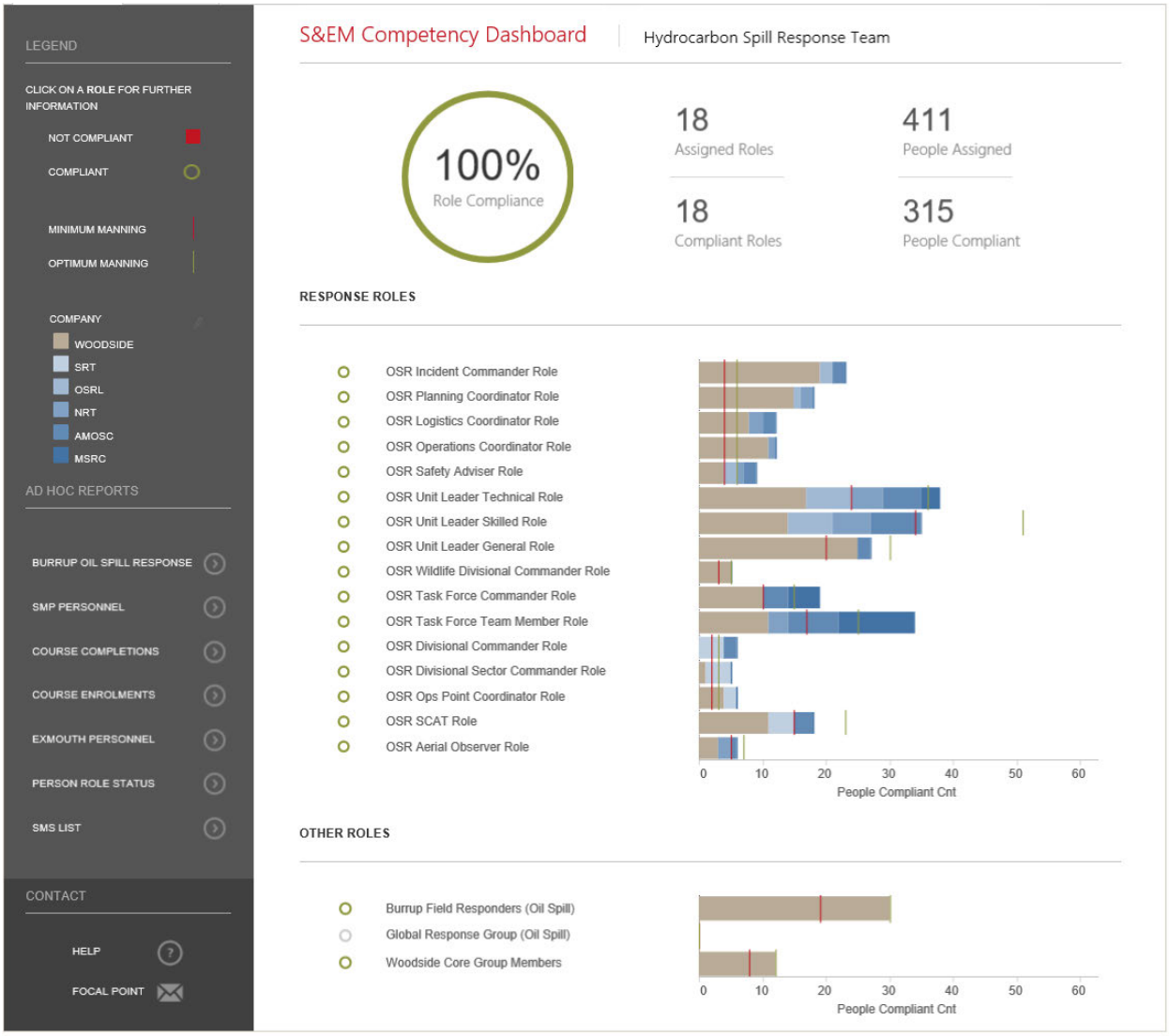


Figure 5-2: Example screen shot of the Hydrocarbon Spill Preparedness competency dashboard

The Dashboard is one of Woodside's key means of monitoring its readiness to respond. It also shows Woodside can meet the requirements of the environmental performance standard relate to filling certain response roles.

Figure 5-3 shows deeper dive into the Operations Point Coordinator role and the training modules required to show competence.

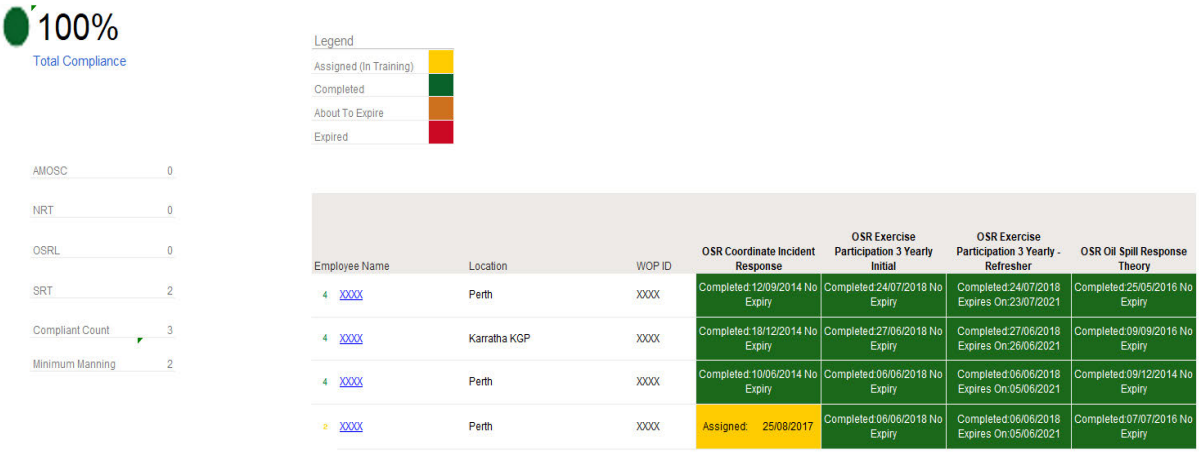


Figure 5-3: Example screen shot for the Operations Point Coordinator role

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: OPEA, FSPs, operational plans, support plans and TRPs) 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[21] vessel schedule, dispersant availability, rig/vessels monitoring, equipment stockpiles, tracking buoy locations and the CIMT duty roster.

d) **Compliance & Assurance** – Ensures all regulator inspection outcomes are actioned and closed out, the global legislation register is up to date and 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 & Compliance System (WiRCS) and subject to the requirements of Woodside's Provide Assurance Procedure.

[21] 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

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 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; and
  - Maintaining access to identified equipment and personnel.
- Planning for hydrocarbon spill response preparedness
- Accountabilities for hydrocarbon spill response preparedness
- Spill training requirements
- Requirements for spill exercising / testing of spill response arrangements
- Spill equipment and services requirements.

The procedure also details the roles and responsibilities of the dedicated Woodside Hydrocarbon Spill Preparedness team. This team is responsible for:

- Assuring that Woodside hydrocarbon spill responders meet competency requirements.
- Establishing the competency requirements, annual training schedule and a training register of trained personnel.
- Establishing and maintaining the total numbers of trained personnel required to provide an effective response to any hydrocarbon spill incident.
- Ensuring equipment and services contracts are maintained
- Establishing OPEPs
- Establishing OPEAs
- Priority response receptor determination
- ALARP determination
- Ensuring compliance and assurance is undertaken in accordance with external and internal requirements.

6 ALARP EVALUATION

This Section should be read in conjunction with Section 5 which is the capability planned for this activity.

6.1 Operational Monitoring – ALARP Assessment

Alternative, Additional and Improved 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 approx. A$300,000.	This option is not adopted as the minimal environmental benefit gained is disproportionate to the cost and complexity of its implementation.	No

6.1.1.2 Additional Control Measures

Additional Control Measures considered
Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures

Option considered	Environmental consideration	Feasibility	Approximate cost	Assessment conclusions	Implemented
Additional personnel trained to use systems.	Current arrangement provides an environmental benefit in the availability of trained personnel facilitating access to 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. A$25,000.	This option is not adopted as the current capability meets the need.	No
Additional satellite tracking buoys to enable greater area coverage.	Increased capability does not provide an environmental benefit compared to the disproportionate cost in having an additional contract in place.	Tracking buoy on location at manned facility, additional needs are met from Woodside owned stocks in King Bay Support Facility (KBSF) and Exmouth or can be provided by service provider.	Cost for an additional satellite tracking buoy would be A$200 per day or A$6000 to purchase.	This option is not adopted as the current capability meets the need, but additional units are available if required.	No
Additional trained aerial observers.	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.	Aviation standards and guidelines ensure all aircraft crews are competent for their roles. Woodside maintains a pool of trained and competent aerial observers with various home base locations to be called upon at the time of an incident. Regular audits of oil spill response organisations ensure training and competency is maintained.	Cost for additional trained aerial observers would be A$2000 per person per day.	This option is not adopted as the current capability meets the need, but additional observers are available via response contractors if required.	No

6.1.1.3 Improved Control Measures

Improved Control Measures considered
Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility

Option considered	Environmental consideration	Feasibility	Approximate cost	Assessment conclusions	Implemented
Faster turnaround time from modelling contractor.	Improved control measure does not provide an environmental benefit compared to the disproportionate cost in having an additional contract in place.	External contractor on CIMT roster to be called as soon as required. However initial information needs to be gathered by CIMT team to request an accurate model. External contractor has person on call to respond from their own location.	Modelling service with a faster activation time would be achieved via membership of an alternative modelling service at an annual cost of A$50,000 for 24 hour access	This option is not adopted as the minimal environmental benefit gained is disproportionate to the cost and complexity of its implementation.	No

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*					
			plus an initial A$5000 per modelling run.		
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 KBSB. The cost and organisational complexity of employing two dedicated response vessels (approximately $15M/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. 2 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:

- ROV intervention
- debris clearance and/or removal
- capping stack (only viable for a loss of well containment where the plume radius is ~25 m)
- relief well drilling.

6.2.1 ROV Intervention

Following confirmation of an emergency event, Woodside would mobilise inspection class ROVs in an attempt to manually activate the BOP either through hydraulic pressure supplied from the ROV or through a subsea accumulator. The ROV available on the MODU can be deployed within 48 hours. Should the ROV on the MODU be unavailable, 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). Following this, a hydraulic accumulator contained as part of the SFRT can be mobilised and deployed with well intervention attempted within 11 days.

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.

Table 6-1: ROV timings

	Estimate ROV inspection duration for Julimar Appraisal and Drilling and Surveys (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 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 for implementing this response would be "no safety case revision required". Timeframes for well intervention are detailed in Figure 6-2 and would be implemented concurrently to the actions required by the "no Safety

Case" revision scenario detailed in **Figure 6-3**, 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 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 6-3** 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 would be implemented concurrently to the actions required by the "No Safety Case" revision scenario detailed in **Figure 6-3**, therefore, the Safety Case scenario will have no impact on the delivery of the strategy.

6.2.3 Capping stack

The Woodside Source Control Response Procedure 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.

Woodside commissioned an independent, subsea site-specific plume analysis, landing study and capping stack deployment feasibility assessment (WWCI, 2019) which indicates shallow water in combination with high absolute open hole flow rates in the event of a worst-case blowout prohibit the safe deployment of a capping stack for the Julimar Appraisal Drilling and Survey. The exclusion zone will be governed by the gas boil at the sea surface and resulting gas plume.

Though all capping stack deployment technologies are unproven, in the event of a loss of well containment where the plume radius is ~25 m, 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 is ~25 m), deployment of a capping stack with a heavy lift vessel with a 150 T crane capacity in shallow waters or 250 T in deeper waters, as recommended in the WWCI study, could be feasible.

Woodside assumes sourcing conventional capping stack deployment vessels would be per the Source Control Response Procedure. 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 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.

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 (~25 m radius) 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 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 has an active heave compensated crane, rated to at least 150 T crane capacity in shallow waters or 250 T in deeper waters and at least 90 m in length and a deck capacity to hold at least 110 T of capping stack.

Timeframes for capping stack deployment detailed in **Figure 6-2** would be implemented concurrently with the actions required for the Safety Case revision development scenarios detailed in **Figure 6-3** 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 Julimar is illustrated in **Figure 6-1**:

- Primary – review internal Woodside drilling programs and MODU availability to source an appropriate rig operating within Australia with an approved Safety Case.
- Alternate – source and contract a MODU through APPEA MOU operating within Australia with an approved Safety Case.
- Contingency – Source and contract a MODU outside Australia with an approved Australian Safety Case.

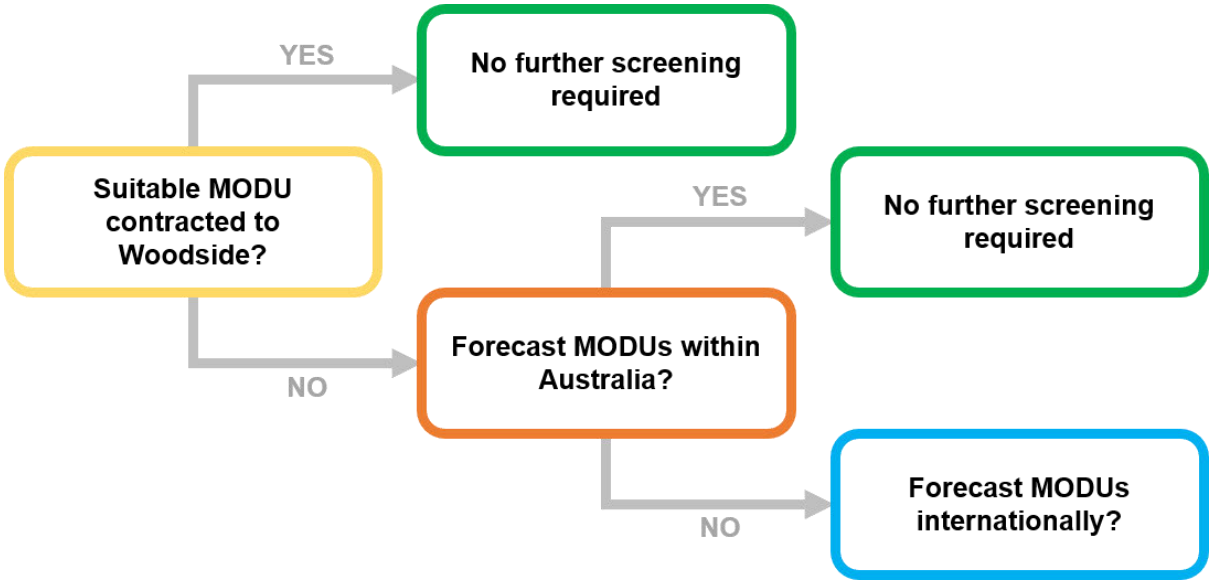


Figure 6-1: Julimar process for sourcing relief well MODU

Woodside has not assessed the timeframe for obtaining a relief well MODU through international supply for this project as the certainty of supply has been confirmed through local supply. 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 61-day[22] period.

The internal and external availability of moored MODUs, plus rig activities of registered operators and rigs with approved safety cases, are tracked by Woodside on a monthly basis, with a two-year look ahead, to ensure 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 the risks have been reduced to ALARP and Acceptable levels through the control measures and performance standards outlined in Section 5.2.

[22] The 61-day duration for drilling of a relief well stated within this section is based upon the most recent studies undertaken during the drafting of the WOMP and activity SCERP.

6.2.4.1 Relief Well drilling timings

The duration of a blowout (from initiation to a successful kill) is assessed as ~61[23] days for Julimar Appraisal Drilling and Surveys well. Relief wells for other wells within the field are expected to be similar duration.

Details on the steps and time required to drill a relief well is shown in **Table 6-2** below. Dynamically positioned and most jack up rigs are not suitable for the JS-1 well water depth, therefore a moored MODU would be required.

On a monthly basis, Woodside tracks and assesses the suitability of available MODUs internally and externally, plus MODU activities of registered operators and MODUs with approved safety cases. MODUs expected to be stationed in Australia for the duration of the project are identified as part of the Relief Well Peer review conducted during the planning phase and immediately prior to spud.

The ability to meet MODU mobilisation of 21 days is screened based on where the pre-identified MODUs will be stationed. For this project, suitable MODUs based in Australia have been identified by Woodside and thus there is a high level confidence the stated 21 day timeframe can be met.

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
Rig Mobilisation	
Secure and suspend well. Complete Relief well design. Secure relief well materials.	8.0
Transit to location based on mobilisation from within the region	2.0
Backload and loadout bulks and equipment, complete internal assurance of relief well design.	2.0
Contingency for unforeseen event	9.0
Mooring activities and relief well construction operations	26
Intersection & well kill comprising the following stages:	
Drill out shoe, conduct formation integrity test and drill towards intersection point	1.5
Execute well-specific ranging plan to accurately intersect wellbore in minimum timeframe	9.5
Pump kill weight drilling fluid per the relief well plan. Confirm the well is static with no further flow	0.5
Contingency for unforeseen technical issues	2.5
Total Discharge Duration	**61**

The following conditions and assumptions are applicable:

[23] The 61-day duration for drilling of a relief well stated within this section is based upon the most recent studies undertaken during the drafting of the WOMP and activity SCERP.

- The 21-day mobilisation time assumes a local MODU is available in Australia with another titleholder.
- A pre-lay mooring spread is required to moor the MODU over subsea infrastructure. Installation would occur in parallel to MODU mobilisation.

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.

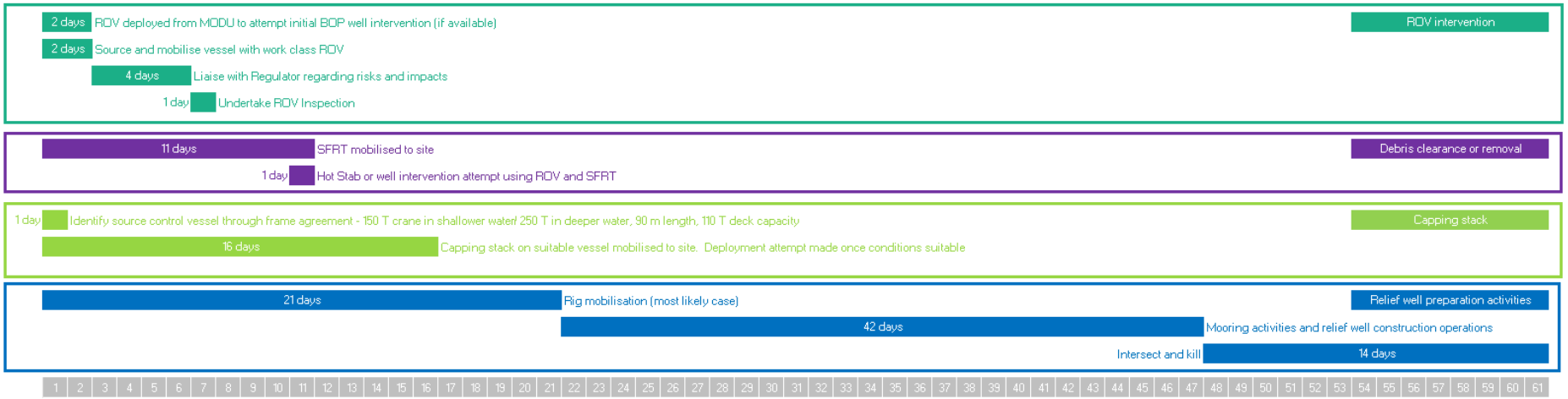


Figure 6-2: Source control and well intervention response strategy deployment timeframes

6.2.4.2 Safety Case considerations

Woodside recognises 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 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 rigs and vessel availability in the region and extended area through contracted arrangements on a monthly basis, with a two-year lookahead.
- Prioritisation of rigs/vessels with current or historical contracting arrangements. Woodside maintains records of previous contracting arrangements and companies. All current contracts for vessels and rigs are required to support Woodside in the event of an emergency.
- Leverage mutual aid arrangements such as the APPEA MOU for vessel and rig 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 6-3**. 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 Julimar Appraisal Drilling and Surveys, 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.

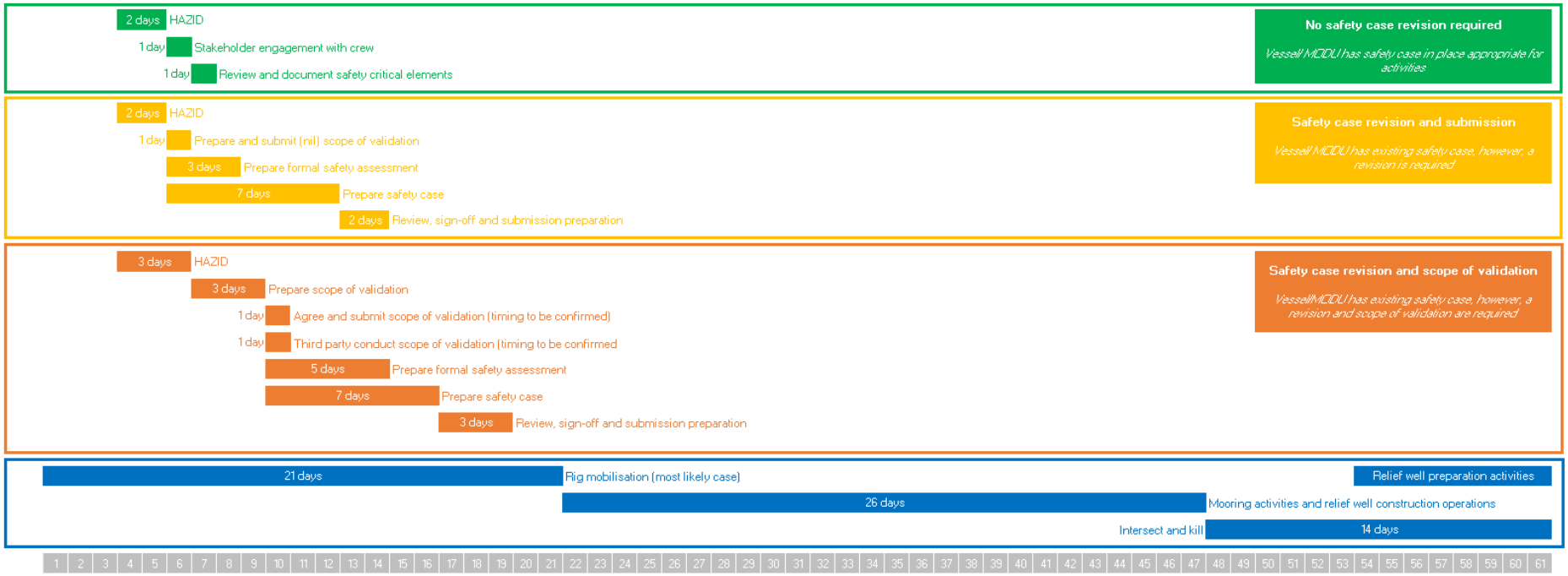


Figure 6-3: Timeline showing safety case revision timings alongside other relief well preparation activity timings

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 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 the vessel for SSDI allows for working in a hydrocarbon environment and control measures are already in place in the existing safety case. For MODU, it assumes 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 assessments described in Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4 outline the primary and alternate approaches Woodside would implement for source control. In Sections 6.2.6 and 6.2.7, Woodside has outlined the options considered against the activation/mobilisation (alternative, additional and improved options) and deployment (additional and improved options) processes as described in Section 2.1.1. This assessment 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.

6.2.5.1 Activation/Mobilisation Options considered

Alternative

- Standby MODU shared for all Woodside activities
- Standby MODU shared across APPEA MOU Titleholders

Additional

- Implement and maintain minimum standards for Safety Case development

Improved

- Monitor internal drilling programs for rig availability
- Monitor external activity for rig availability
- Monitor status of Registered Operators/ Approved Safety cases for rigs

6.2.5.2 Deployment Options considered

Additional

- Offset capping alternative to conventional capping stack deployment
- Dual vessel capping stack deployment
- Subsea Containment System alternative to capping stack deployment
- Pre-drilling top-holes
- Purchase and maintain mooring system
- Contract in place with WWCI and Oceaneering

Improved

- Maintaining relief well drilling supplies (mud, casing, etc).

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 5.2 reduces the risk to ALARP. The Alternative, Additional and Improved control measures that have been assessed and selected are highlighted in green and the relevant performance of the selected control is cross referenced. Items highlighted in red have been considered and rejected on the basis 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	**Feasibility**	**Environmental benefits/impacts**	**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 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$1.95 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	**Feasibility**	**Environmental benefits/impacts**	**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	**Feasibility**	**Environmental benefits/impacts**	**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 that Woodside would be in a position to understand which other rigs might 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 other drilling programs internally is that Woodside would be in a position to understand which other rigs might 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 – Control Measure Options Analysis

6.2.7.1 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**	**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 Julimar well (163 m), 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 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 it will require a 600+MT crane vessel for deployment to ensure there is useable hook height for the crane to conduct the lift of the carrier. Vessels with such capability and a current Australian vessel safety case are not locally or readily available.	Due to risks, uncertainty and complexity of this option, and the inability to realise any environmental gains, any cost would be disproportionate to the benefits gained.	The titleholder 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 Julimar location. Implementation of a novel technology such as OIE culminates in low certainty of success while at the same time increasing associated health and safety risks. As such the primary source control response and ALARP position remains drilling a relief well.	No
Dual vessel capping stack deployment	While the use of dual vessel to deploy the capping system could reduce the quantity of hydrocarbon entering the marine environment, this is an unproven technology. Additionally, the feasibility issues surrounding a dual vessel capping deployment in the water depths at the Julimar well (163 m), 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 120 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	The timing for mobilisation, deployment and activation of the subsea containment system is likely to be longer (>90 days), than the expected 61 day[24] 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 option would not provide an environmental benefit.	No

[24] The 61-day duration for drilling of a relief well stated within this section is based upon the most recent studies undertaken during the drafting of the WOMP and activity SCERP.

	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 duration is 61 days before drilling of a relief well under the adopted control measure.		this Petroleum Activities Program is not considered reasonably practical and are considered disproportionate to the environmental benefit gained.		
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. $555,000 per day over the PAP based on 2-4 days of top-hole drilling (plus standby time) for the 5 wells as the worst-case scenarios.	This option would not provide an environmental benefit due to the additional environmental impacts coupled with a lack of improved relief well timings.	No
Purchase and maintain mooring system	Purchasing and maintaining a mooring system could provide a moderate environmental benefit as it may reduce equipment sourcing time. However, due to the continued need for specialists to install the equipment plus sourcing a suitable vessel, the timeframe reduction would be minimal.	Woodside is not a specialist in installing and maintaining moorings so would require specialists to come in to install the moorings and would also require specialist vessels to be sourced to undertake the work.	The cost of purchasing, storing and maintaining pre-lay mooring systems with anchors, chains, buoys and ancillary equipment is considered grossly disproportionate to the environmental benefit gained.	This option would not provide an environmental benefit as timeframe reductions would be minimal.	No
Contract in place with Wild Well Control and Oceaneering	Woodside has an agreement in place with Wild Well Control Inc and Oceaneering to provide trained personnel in the event of an incident. This will ensure competent personnel are available in the shortest possible timeframe.	Having contracts in place to access trained, competent personnel in the event of an incident would reduce mobilization times. This option is considered reasonably practicable.	Minimal cost implications – Woodside has standing contract in place to provide assistance across all activities.	This control measure is adopted as the costs and complexity are not considered grossly disproportionate to any environmental benefit that might be realised.	Yes

6.2.7.2 Improved Control Measures

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate cost**	**Assessment conclusions**	**Implemented**
Maintaining relief well drilling supplies	There is not predicted to be any reduction in relief well timing or spill duration from Woodside maintaining stocks of drilling supplies (mud, casing, cement, etc.)	It would be feasible to source some relief well drilling supplies such as casing but the actual composition of the cement and mud required will need to be specific to the well. This option is also not deemed necessary as the lead time for sourcing and mobilising these supplies is included in the 21 days for sourcing and mobilising a rig.	The capital cost of Woodside purchasing relevant drilling supplies is expected to be approximately A$600,000 with additional costs for storage and ongoing costs for replenishment. These costs are considered	This option would not provide an environmental benefit.	No

			disproportionate to the environmental benefit gained.		

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 WWCI 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 Source Control via Vessel SOPEP – Control Measure Options Analysis

6.3.1.1 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**	**Approx. Cost**	**Implemented**
No reasonably practical alternative control measures identified.				N/A

6.3.1.2 Additional Control Measures

Additional Control Measures considered *Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures*				
Option considered	**Environmental consideration**	**Feasibility**	**Approx. Cost**	**Implemented**
No reasonably practical alternative control measures identified.				N/A

6.3.1.3 Improved Control Measures

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*				
Option considered	**Environmental consideration**	**Feasibility**	**Approx. Cost**	**Implemented**
No reasonably practical alternative control measures identified.				N/A

6.3.1.4 Selected control measures

Following review of alternative, additional and improved control measures, the following controls were selected for implementation for the activity.

- Alternative
  - None selected
- Additional
  - None selected
- Improved
  - None selected

6.4 Shoreline Protection & 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 existing level of capability is based on internal and third-party resources 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 logistics and operational limitations beyond Woodside's direct control.

6.4.2 Response Planning: Julimar Appraisal Drilling and Surveys – 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 this would require effective mobilisation to priority shorelines and maintenance of protection until operational monitoring confirms the locations were no longer at risk. Woodside has identified the RPAs from deterministic modelling results provided from specific scenarios. The full list of RPAs predicted to be contacted by oil is detailed in **Table 3-1**.

The control measures selected provide capability to mobilise shoreline protection equipment by Day 7 (if required). Modelling scenarios indicate no shoreline contact is predicted at response thresholds (>100 g/m^2), however, first shoreline impact at 10 g/m^2 is at Barrow Island within 7.3 days for the loss of well containment scenario. Given shoreline contact at RPAs is not predicted until Day 7.3 at Barrow Island and only at 10 g/m^2, the existing capability is 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). OM04 would only be undertaken in liaison with WA DoT.

Tactical response plans exist for many of the RPAs identified. The plans identify values and sensitivities that would be protected at each location. Modelling does not predict all priority protection shorelines will be at risk of contact at the same time. Therefore, to allow for the best use of available shoreline protection and deflection resources, operational monitoring (OM01, OM02 and OM03) will inform the response, targeting RPAs where contact is predicted (

Table 6-5).

Table 6-4 below outlines the capability required (number of RPAs predicted to be impacted) against the capability available (number of shoreline protection and deflection operations that can be mobilised and deployed). As can be seen from the table below, Woodside's capability exceeds the response planning need identified for shoreline protection and deflection operations at identified RPAs.

Table 6-4: Response Planning – Shoreline Protection and Deflection

	Shoreline Protection & Deflection	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
	Shoreline accumulation (above 10 g/m^2)[25] – m^3	0	0	0	0	0	0	8	6	2	2	9	0	0
A	Capability Required													
A1	Number of RPAs contacted (>10 g/m^2) – LOWC	0	0	0	0	0	0	2	1	1	1	2	0	0
B	Capability Available (operations per day)													
B1	SPD operations available – per day (lower)	0	1	1	2	2	4	6	70	70	70	330	330	0
B2	SPD operations available – per day (upper)	1	2	3	4	6	8	10	84	84	84	336	336	0
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	0
C2	SPD operations gap – per day (upper)	0	0	0	0	0	0	0	0	0	0	0	0	0

A1 – the number of Response Protection Areas contacted at the maximum accumulated volume.
B1 and B2 – the upper and lower number of shoreline protection and deflection operations available (based on response planning assumptions in Section 0).
C1 and C2 – the gap between the upper and lower number of shoreline protection and deflection operations required in A1 compared to the operations available in B1 and B2

[25] No shoreline contact predicted at response threshold (100 g/m^2) therefore contact shown in this table is at 10 g/m^2.

Table 6-5: Indicative Tactical Response Plan, aims and methods for identified RPAs

Tactical Response Plan	Response aims and methods
Barrow Island, Montebello & Lowendal	**First response objective:** Ongoing operational monitoring and evaluation of the hydrocarbon spill to adapt aims and response tactics to the evolving nature of the incident and to assist in locating relevant booming areas **Second response objective**: Protection of sensitive areas. Prevent hydrocarbons impact through use of shoreline booms. Areas to protect and formation types to deploy will be dependent on the time available until the hydrocarbon impacts the shoreline and local geographical and tidal/weather conditions **Third response objective**: 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 **Fourth response objective**: Recovery of floating oil where possible through the use of skimming systems and other appropriate recovery devices. 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 spreading of oil down a coastline **Fifth response objective:** Clean-up of the shoreline. Manual clean up techniques, use of mechanical recovery methods and techniques where appropriate
Montebello Island – Hermite/Delta Island Channel TRP	**First response objective:** Ongoing operational monitoring and evaluation of the hydrocarbon spill to adapt aims and response tactics to the evolving nature of the incident and to assist in locating relevant booming areas **Second response objective**: Protection of Mansion Bay. Prevent hydrocarbon passing through the channel into Mansion Bay with the use of shoreline booms. Formation types to deploy will be dependent on the time available until the hydrocarbon impacts the shoreline and local geographical and tidal/weather conditions
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.
Exmouth Gulf	**First Response Aim:** Undertake Monitor and Evaluate strategy – Shoreline assessment techniques to be undertaken. **Second Response Aim:** 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 Aim:** 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 Aim:** 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 Aim:** Clean-up of oiled shoreline using manual clean up techniques, predominantly rakes and shovels, with flushing and vacuum skimming if appropriate and required. Operational NEBA required prior to deployment. **Sixth Response Aim:** Collection and cleaning of oiled wildlife.
Ningaloo coast – Mangrove Bay	**First Response Objective:** Protection of Mangrove Bay Lagoon. Methods: Prevent oil ingress to lagoons through use of shore sealing booms. Complete northern lagoon first, then southern if required – depending on beach topography and tidal cycle. **Second Response Objective:** Pre-clean of the beach area. Methods: 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:** Recovery of oil at lagoon entrance. Methods: Use skimmer to recover floating oil. **Fourth Response Objective:** Clean-up of oiled shoreline. Methods: Manual clean up techniques, predominantly rakes and shovels, with flushing and vacuum skimming if appropriate and required
Ningaloo coast – Turquoise Bay	**First Response Objective:** Pre-clean of the beach area. Method: Using rakes and shovels move any debris on the beach to above the high tide area, above the reach of any floating oil. **Second Response Objective:** Clean-up of oiled shoreline. Method: Manual clean up techniques, predominantly rakes and shovels, with flushing and vacuum skimming if appropriate and required.
Ningaloo coast – Yardie Creek	**First Response Objective:** Protection of Yardie Creek entrance. Methods: Prevent oil ingress to lagoon through use of shore sealing boom. **Second Response Objective:** Pre-clean of the beach area. Methods: 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:** Recovery of oil at Yardie Creek entrance. Methods: Use skimmer to recover floating oil into temporary storage.

	Fourth Response Objective: Clean up of oiled shoreline. Methods: Manual clean up techniques, predominantly rakes and shovels, with flushing and vacuum skimming if appropriate and required.
Ningaloo coast – Jurabi-Lighthouse Beaches	**First Response Objective:** Pre-clean of the beach area. Method: Using rakes and shovels move any debris on the beach to above the high tide area, above the reach of any floating oil. **Second Response Objective:** Clean-up of oiled shoreline. Method: 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 and additional TRPs drafted only when operational monitoring (OM02 and OM03) and modelling (OM01) indicate 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.

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$6100 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$2000 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 contact at response threshold (>100 g/m^2) for the duration of the spill, and shoreline contact at 10 g/m^2 is not predicted until Day 7.3 at Barrow Island (CS-01), Woodside considers 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 response threshold (>100 g/m^2) for the duration of the spill, and shoreline contact at 10 g/m^2 is not predicted until Day 7.3 at Barrow Island, 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 existing level of capability is based on internal and third-party resources are available 24 hours per day, 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 beyond Woodside's direct control.

6.5.2 Response planning: Julimar Appraisal Drilling and Surveys – Shoreline Clean-up

Woodside has assessed existing capability against the WCCS and has identified 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.

Given modelling for the loss of well control scenario does not predict shoreline contact at response threshold (>100 g/m^2) for the duration of the spill, and shoreline contact at 10 g/m^2 is not predicted until Day 7.3 (CS-01) at Barrow Island (5 m^3), Woodside is satisfied that the current capability is managing risks and impacts to ALARP. The largest volume ashore is at Exmouth, Ningaloo Coast World Heritage Area and State Marine Park, and Cape Range with approximately 7 m^3 predicted on day 35.6 (Error! Reference source not found.). The full list of RPAs predicted to be contacted by oil is detailed in **Table 3-1** and relevant Tactical Response Plans available for identified RPAs are included in

Table 6-5.

In the unlikely 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.

These figures have been combined into a single response planning need scenario providing a worst-case scenario for planning purposes as outlined below. Given all other shoreline contact scenarios identified from modelling are longer time frames and lesser volumes, demonstration of capability against this need will ensure Woodside can meet requirements for any other outcome.

Woodside has identified several options which could be mobilised to achieve defined response objectives. Evaluation considers the benefit in terms of the time to respond and the scale of response made possible by each option. The evaluation of possible control measures is summarised in Section 6.5.3.

Table 6-6: Response Planning – Shoreline Clean-up

	Shoreline Clean-up (Phase 2)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Week 2	Week 3	Week 4	Month 2	Month 3	Month 4
	Shoreline accumulation (above 10 g/m^2)[26] – m^3	0	0	0	0	0	0	8	6	2	2	9	0	0
	Oil remaining following response operations - m^3	0	0	0	0	0	0	0	0	2	0	3	2	0
A	**Capability Required (number of operations)**													
A1	Shoreline clean-up operations required (lower)	0	0	0	0	0	0	1	1	1	0	1	0	0
A2	Shoreline clean-up operations required (upper)	0	0	0	0	0	0	1	1	1	0	2	0	0
B	**Capability Available (number of operations)**													
B1	Shoreline clean-up operations available - Stage 2 - Manual (lower)	0	1	3	5	8	12	15	105	105	105	560	560	560
B2	Shoreline clean-up operations available - Stage 2 - Manual (upper)	0	2	5	8	10	15	20	140	140	140	560	560	560
C	**Capability Gap**													
C1	Shoreline clean-up operations gap (lower)	0	0	0	0	0	0	0	0	0	0	0	0	0
C2	Shoreline clean-up 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.

[26] No shoreline contact predicted at response threshold (100 g/m^2) therefore contact shown in this table is at 10 g/m^2.

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$2000 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$2000 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 for the loss of well control scenario does not predict shoreline contact at response threshold (>100 g/m^2) for the duration of the spill, and shoreline contact at 10 g/m^2 is not predicted until Day 7.3 (CS-01) at Barrow Island (5 m^3), Woodside considers 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	The cost of establishing a local stockpile of new shoreline clean-up equipment closer to the expected hydrocarbon stranding areas is not commensurate with the need.	This option is not adopted as the existing capability meets the need.	No

		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 for the duration of the spill, and shoreline contact at 10 g/m^2 is not predicted until Day 7.3 (CS-01) at Barrow Island (5 m^3) therefore allowing enough time to re-locate existing equipment, personnel and other resources to the most appropriate areas.			

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 available 24 hours per day, 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 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 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.		Additional wildlife treatment systems	The selected delivery options provide access to call-off contracts with selected specialist providers. The agreements ensure 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.	No
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.			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.		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 as outlined above, 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 existing level of capability is based on internal and third-party resources available 24 hours per day, 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/restocking provisions, and other similar logistic and operational limitation 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$1300 per m3. 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. 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	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

	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 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 limitations 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	The environmental consideration of having access to suitable laboratory facilities in Karratha to carry out the hydrocarbon analysis would provide faster turnaround in reporting of results only by a matter 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	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	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**

hydrocarbon release		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 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.			

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)	Mobilise SMP Lead/Manager and SMP Coordinator to the CIMT Planning function.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager and SMP Coordinator)	Constantly assess all outputs from OM01, OM02 and OM03 (Section 5 and ANNEX B: Operational Monitoring Activation and Termination Criteria) 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 the SMP contractor. Stands up subject matter experts, if required.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager SMP Coordinator, SMP standby contractor SMP manager)	Establish if, and where, pre-contact baseline data acquisition is required. Determine practicable baseline acquisition program based on predicted timescales to contact and anticipated SMP mobilisation times. Determine scope for preliminary post-contact surveys during the Response Phase. Determine 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 SMP manager)	If response phase data acquisition is required, stand up the contractor SMP teams for data acquisition and instruct them to standby awaiting further details for mobilisation from the CIMT.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator, SMP standby contactor SMP manager)	SMP 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)	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.

Responsibility	Action
(SMP Lead/Manager, SMP Coordinator SMP standby contactor SMP manager)	Engage with SMP standby contactor SMP Manager and CIMT Logistics to establish mobilisation plan, secure logistics resources and establish ongoing logistical support operations, including: • Vessels, vehicles and other logistics resources • Vessel fit-out specifications (as detailed in the Scientific Monitoring Program Operational Plan) • Equipment storage and pick-up locations • Personnel pick-up/airport departure locations • Ports of departure • 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 contactor (SMP manager)	Confirm communications procedures between Woodside SMP team, SMP contractor SMP Duty Manager, SMP Team Leads and Operations Coordinator (CIMT).
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 SMP contractor SMP Duty Manager. Agree SMP mobilisation timeline and induction procedures with the Operations Coordinator (CIMT).
CIMT Logistics	Coordinate with SMP contactor SMP Duty Manager 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 Operations Coordinator (CIMT).

6.8.5 ALARP and Acceptability Summary

ALARP and Acceptability Summary		
Scientific Monitoring		
ALARP Summary		All known reasonably practicable control measures have been adopted
	X	Determine baseline data needs and activate SMPs for any identified PBAs in the event of an unplanned hydrocarbon release
		No reasonably practical additional, alternative, and/or improved control measure exists
	The resulting scientific monitoring capability has been assessed against the worse case credible spill scenarios. The range of SMP 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 considered Medium. The SMP's main objectives can be met.	
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. • Throughout the PAP, relevant Australian standards and codes of practice will be followed to evaluate the impacts from a loss of well containment. • The level of impact and risk to the environment has been considered with regard to the principles of Environmentally 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 the worst-case 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 & 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
- potential contamination and toxicity effects to benthic and in-water biota from drilling fluids.

Potential impacts from the discharge of cuttings range from the complete burial of benthic biota in the immediate vicinity of the well site due to sediment deposition, smothering effects from raised sedimentation concentrations as a result of elevated TSS, changes to the physico-chemical properties of the seabed sediments (particle size distribution and potential for reduction in oxygen levels within the surface sediments due to organic matter degradation by aerobic bacteria) and subsequent changes to the composition of infauna communities to minor sediment loading above background and no associated ecological effects. Predicted impacts are generally confined to within a few hundred metres of the discharge point (International Association of Oil and Gas Producers 2016) (i.e. within the EMBA for a hydrocarbon spill event).

The discharge of drill cuttings and unrecoverable fluids from relief well drilling is expected to increase turbidity and TSS levels in the water column, leading to an increased sedimentation rate above ambient levels associated with the settlement of suspended sediment particles 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 EP. Modelling results indicating the TSS plume of suspended cuttings will typically disperse to the south-west while oscillating with the tide and diminish rapidly with increasing distance from the well locations. Maximum TSS concentrations predicted for 100 m; 250 m and 1 km distances from the wellsite were 7, 5 and 1 mg/L, respectively. Furthermore, water column concentrations below 10 mg/L remain within 235 m of the discharge location for each modelled well. For all well discharge locations (outside of direct discharge sites), TSS concentration did not exceed 10 mg/l. Nelson et al. (2016) identified <10 mg/L as a no effect or sub-lethal minimal effect concentration.

The low sensitivity of the deep-water benthic communities/habitats within and in the vicinity of relief well locations, combined with the relatively low toxicity of water based muds (WBM) and non-water based muds (NWBMs), there being no bulk discharges of NWBM and the highly localised nature and scale of predicted physical impacts to seabed biota, indicate any localised impact would likely be of a slight magnitude (especially when considering the broader consequence of the loss of well containment event a relief well drilling activity would be responding too).

Vessel operations and anchoring

During the implementation of response techniques, where water depths allow, it is possible 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 personnel may have minimal, localised impacts on habitats, wildlife and coastlines. The impacts associated with human presence on shorelines during shoreline surveys and response operations may include:

- damage to vegetation/habitat, especially in sensitive locations such as mangroves and turtle nesting beaches, to gain access to areas of shoreline oiling
- damage or disturbance to wildlife during shoreline surveys
- removal of surface layers of intertidal sediments (potential habitat depletion)
- excessive removal of substrate causing erosion and instability of localised areas of the shoreline
- compaction of sediments.

Any impacts are expected to be localised with full recovery expected.

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 further injury and the removal of water proofing feathers are managed and mitigated. Finally, during the release phase it's important wildlife is not released back into a contaminated environment.

Waste generation

Implementing the selected response techniques will result in the generation of the following waste streams will require management and disposal:

- liquids (recovered oil/water mixture), recovered from shoreline clean-up operations and oiled wildlife response
- semi-solids/solids (oily solids), collected during shoreline clean-up operations and oiled wildlife response
- debris (e.g. seaweed, sand, woods, plastics), collected during shoreline clean-up operations and oiled wildlife response.

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 prior to impact could minimise the amount of contaminated organic material and thus reduce the amount of oiled/hazardous waste to be handled. However, removal of vegetation also allows more extensive penetration of oil into the substrate and may lead to habitat loss. Any impacts are expected to be localised with full recovery expected.

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 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 the treatment measures identified in this assessment will be captured in Operational Plans, TRPs, and/or the FSP.

Vessel operations and access in the nearshore environment

- If vessels are required for access, anchoring locations will be selected to minimise disturbance to benthic primary producer habitats. Where existing fixed anchoring points are not available, locations will be selected to minimise impact to nearshore benthic environments with a preference for areas of sandy seabed where they can be identified (Performance Standard (PS) 14.1, PS 17.1).
- Shallow draft vessels will be used to access remote shorelines to minimise the impacts associated with seabed disturbance on approach to the shorelines (PS 14.2, PS 17.2).

Presence of personnel on the shoreline

- Oversight by trained personnel who are aware of the risks (PS 17.6).
- Trained unit leaders brief personnel prior to operations of the environmental risks of presence of personnel on the shoreline (PS 17.7).
- Shoreline access route (foot, car, vessel and helicopter) with the least environmental impact identified will be selected by a specialist in SCAT operations (PS 7.3, PS 17.4).
- Vehicular access will be restricted on dunes, turtle nesting beaches and in mangroves (PS 17.3).

Additional stress or injury caused to wildlife

- Oiled wildlife operations (including hazing) would be implemented with advice and assistance from the Oiled Wildlife Advisor from the DBCA and in accordance with the processes and methodologies described in the WA OWRP and the relevant regional plan (PS 21.1).

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).
- Removal of vegetation will be limited to moderately or heavily oiled vegetation (PS 17.5).

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 has 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:
    - 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 the capability in place is sufficient for all other scenarios 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 considers the hydrocarbon spill risks and impacts to 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 (external persons/ organisations) and are aligned with the uniqueness of, and/or the level of protection assigned to the environment, its sensitivity to pressures introduced by the activity, and the proximity of activities to sensitive receptors, and have been aligned with Part 3 of the EPBC Act.
- Selected control measures meet requirements of legislation and conventions to which Australia is a signatory (e.g. International Convention for the Prevention of Pollution from Ships (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

EMSA, Manual on the applicability of oil spill dispersants, 2010, Vers 2, p 57.

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 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/

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 & 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.
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])
Receptors at risk	Physical, biological and social resources identified as at risk from hydrocarbon contact using oil spill modelling predictions.
Receptor areas	Geographically referenced areas such as bays, islands, coastlines and/or protected area (WHA, Commonwealth or State marine reserve or park) containing one or more receptor type.

Term	Description / Definition
Receptor Sensitivities	This is a classification scheme to categorise receptor sensitivity to an oil spill. The Environmental Sensitivity Index (ESI) is a numerical classification of the relative sensitivity of a particular environment (particularly different shoreline types) to an oil spill. Refer to the Woodside OPEA 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.
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
AIIMS	Australasian Inter-Service Incident Management System
AHV	Anchor Handling Vessel
ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
APPEA	Australian Petroleum Production and Exploration Association
AUV	Autonomous Underwater Vehicle
BAOAC	Bonn Agreement Oil Appearance Code
BOP	Blowout Preventer
CEDRE	Centre for Documentation, Research and Experimentation on Accidental Water Pollution
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (US)
CFD	Computational Fluid Dynamic
CIMT	Corporate Incident Management Team
CMT	Crisis Management Team
cSt	Centistokes
DBCA	Western Australia Department of Biodiversity, Conservation and Attractions (former Western Australian Department of Parks and Wildlife)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (former Department of Agriculture, Water and the Environment)
DM	Duty Manager
DOR	Dispersant to Oil Ratio
EMBA	Environment that May Be Affected
EMSA	European Maritime Safety Agency
Environment Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
EP	Environment Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESI	Environmental Sensitivity Index
ESD	Environmentally Sustainable Development
ESP	Environmental Services Panel
FSP	First Strike Plan
FWADC	Fixed Wing Aerial Dispersant Contract
GDS	Global Dispersant Stockpile (service from OSRL)
GIS	Geographic Information System
GRN	Global Response Network

Abbreviation	Meaning
HAZID	Hazard Identification
HSEQ	Health Safety Environment and Quality
IAP	Incident Action Plan
ICE	Incident Control Environment
IGEM	Industry-Government Environmental Meta-database
IMS	Incident Management System
IMSA	Index of Marine Surveys for Assessment
IMT	Incident Management Team
IOGP	International Association of Oil and Gas Producers
IPIECA	International Petroleum Industry Environment Conservation Association
ISV	Infield support vessel
IT	Information Technology
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union for Conservation of Nature
JS-1	Julimar South-1 Well
KBSF	King Bay Support Facility
LEL	Lower Explosive Limit
LOWC	Loss of Well Containment
MARPOL	International Convention for the Prevention of Pollution from Ships
MMA	Marine Management Area
MODU	Mobile Offshore Drilling Unit
MOU	Memorandum of Understanding
MSRC	Marine Spill Response Corporation
NATA	National Association of Testing Authorities (Australia)
NEBA	Net Environmental Benefit Analysis
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NRDA	Natural Resource Damage Assessment
NWBM	Non-Water Based Muds
OIE	Offset Installation Equipment
OILMAP	Oil Spill Model and Response System
OM	Operational Monitoring
OPEA	Oil Pollution Emergency Arrangements
OPEP	Oil Pollution Emergency Plan
OSCA	Oil Spill Cleaning Agent (registered for use within the National Plan)
OSPRMA	Oil Spill Preparedness and Response Mitigation Assessment
OSRL	Oil Spill Response Limited

Abbreviation	Meaning
OSRO	Oil Spill Response Organisations
OSTM	Oil Spill Trajectory Modelling
OWRP	Oiled Wildlife Response Plan
OWROP	Regional Oiled Wildlife Response Operational Plan
PAP	Petroleum Activities Program
PBA	Pre-emptive Baseline Areas
PPB	Parts per billion
PPM	Parts per million
PS	Performance Standard
QA/QC	Quality Assurance/ Quality Control
ROV	Remotely Operated Vehicle(s)
RPA	Response Protection Area
S&EM	Security & Emergency Management
SCAT	Shoreline Clean-up Assessment Technique
SDA	Surface Dispersant Application
SFRT	Subsea First Response Toolkit
SIMA	Spill Impact Mitigation Assessment
SIMAP	Integrated Oil Spill Impact Model System
SIMOPs	Simultaneous Operations
SMP	Scientific Monitoring Program
SSDI	Subsea Dispersant Injection
SFRT	Subsea First Response Toolkit
SIMA	Spill Impact Mitigation Assessment
SM	Scientific Monitoring
SME	Subject Matter Expert
SMP	Scientific Monitoring Program
SPD	Shoreline Protection and Deflection
TRP	Tactical Response Plan
TSS	Total Suspended Solids
UAS	Unmanned Aerial Systems
UAV	Unmanned Aerial Vehicles
VOC	Volatile Organic Compound
WA DoT	Western Australia Department of Transport
WBM	Water Based Muds
WCCS	Worst Case Credible Scenario
WHA	World Heritage Area
WiRCS	Woodside Integrated Risk & Compliance System

Abbreviation	Meaning
Woodside	Woodside Energy Limited
WWCI	Wild Well Control Inc
ZoA	Zone of Application

ANNEX A: NET ENVIRONMENTAL BENEFIT ANALYSIS DETAILED OUTCOMES

Pre-operational NEBAs have been conducted to assess the net environmental benefit of different response techniques to selected receptors in the event of an oil spill from the PAP for a loss of well containment of Julimar Condensate from the Julimar Appraisal Drilling and Surveys. 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) – please note that no floating hydrocarbon is predicted at this threshold for the duration of the spill event for CS-01.
- Shoreline accumulation (100g/m^2) at any time – please note that no shoreline hydrocarbon contact is predicted at this threshold for the duration of the spill event for either CS-01 or CS-02.
- Entrained contact (>100 ppb and <14 days)

The detailed NEBA assessment outcomes are shown below. The Julimar Appraisal Drilling and Surveys project preoperational NEBAs contains the full assessments.

Table A-1: NEBA assessment technique recommendations for Julimar Condensate (CS-01)

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
Hermite Island, Montebello Islands & MP	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes
Exmouth, Ningaloo Coast WH, Ningaloo MP (State), Cape Range	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes
Middle Pilbara - Islands and Shoreline, Muiron Islands, Muiron Islands MMA, Passage Islands, North Sandy Island NR	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes
Montebello MP*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Boodie, Double Middle Islands Nature Reserve NR	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes
Barrow Island	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes
Lowendal Islands	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes
Southern Pilbara - Islands, Airlie Island	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes
Gascoyne MP*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Barrow Island MMA*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Barrow Island MP (State)*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Penguin Bank*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Poivre Reef*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Rankin Bank*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Ripple Shoals*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Tryal Rocks*	Yes	Yes	N/A	No	No	No	No	No	N/A	N/A	N/A	N/A	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	Potentially	Potentially	No	Yes
NEBA identifies response potentially of net environmental benefit?	Yes	Yes	N/A	No	No	No	No	No	Yes	Potentially	Potentially	No	Yes

Table A-2: NEBA assessment technique recommendations for marine diesel (CS-02)

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
Montebello Islands	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes
Montebello MP*	Yes	N/A	Yes	N/A	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Montebello State MP	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes
Muiron Islands & MMA	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes
Ningaloo Coast North, Middle, RUZ & WHA	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes
Pilbara Islands - Southern Islands Group	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes
Rankin Bank*	Yes	N/A	Yes	N/A	No	No	No	No	N/A	N/A	N/A	N/A	Yes
Gascoyne MP*	Yes	N/A	Yes	N/A	No	No	No	No	N/A	N/A	N/A	N/A	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	N/A	N/A	N/A	N/A	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[27]	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))

.

[27] 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 1 (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 2 (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 3 (OM03) Monitoring of hydrocarbon presence, properties, behaviour and weathering in water	OM03 will measure surface, entrained and dissolved hydrocarbons in the water column to inform decision-making for spill response activities. The specific objectives of OM03 are as follows: • Detect and monitor for the presence, quantity, properties, behaviour and weathering of surface, entrained and dissolved hydrocarbons. • Verify predictions made by OM01 and observations made by OM02 about the presence and extent of hydrocarbon contamination. Data collected in OM03 will also be used for the purpose of longer-term water quality monitoring during SM01.	OM03 will be triggered immediately following a level 2/3 hydrocarbon spill.	The criteria for the termination of OM03 are as follows: • The hydrocarbon release has ceased. • Response activities have ceased. • Concentrations of hydrocarbons in the water are below available ANZECC/ ARMCANZ (2018) trigger values for 99% species protection.

Operational Monitoring Operational Plan	Objectives	Activation triggers	Termination criteria
Operational Monitoring Operational Plan 4 (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 5 (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 standby SMP 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 standby SMP 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 Function • 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 Function • Sits in the Planning function of the CIMT. • Liaises with other CIMT functions 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 Chief Environmental Scientist 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).

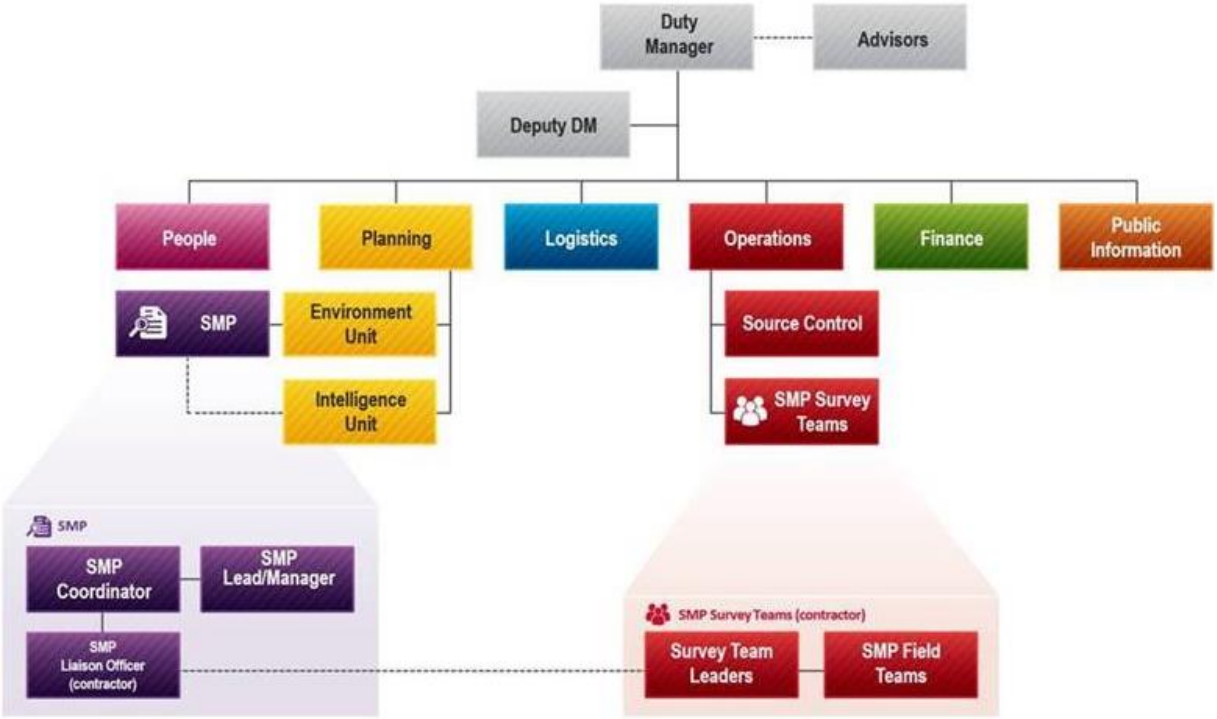


Figure C-1: Woodside Oil Spill Scientific Monitoring Program Delivery Team and Linkage to Corporate Incident Management Team (CIMT) organisational structure.

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[28]) 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/m^2 surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m^2 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[29]) 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/m^2 surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m^2 for shoreline accumulation) for subtidal and intertidal benthic habitat.	SM03 will be terminated once pre-spill condition is reached and agreed upon as per the SMP termination criteria process and include consideration of: • Overall impacts to benthic habitats from hydrocarbon exposure have been quantified. • Recovery of impacted benthic habitats has been evaluated. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 4 (SM04)	The objectives of SM04 are: • Characterize the status of mangroves (and associated salt marsh habitat) at shorelines exposed/contacted by spilled hydrocarbons;	SM04 will be activated in the event of a Level 2 or 3 hydrocarbon release, or any release event with	SM04 will be terminated once pre-spill condition is reached and agreed upon as per the SMP

[28] NOPSEMA (2019) Bulletin #1 – Oil spill modelling – April 2019, https://www.nopsema.gov.au/assets/Bulletins/A652993.pdf
[29] 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
Assessment of Impacts and Recovery of Mangroves / Saltmarsh	• 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.	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/m^2 surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m^2 for shoreline accumulation) for mangrove/saltmarsh habitat.	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/m^2 surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m^2 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/m^2 surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m^2 for shoreline accumulation) at known marine turtle rookery locations; or • Records of dead, oiled or injured marine turtle species made during the hydrocarbon spill or response.	SM06 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Impacts to nesting marine turtle populations from hydrocarbon exposure have been quantified. • Recovery of impacted nesting marine turtle populations has been evaluated. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 7 (SM07) **Assessment of Impacts to Pinniped Colonies including Haul-out Site Populations**	The objectives of SM07 are to: • Quantify impacts on pinniped colonies and haul-out sites as a result of hydrocarbon exposure/contact. • Collate and quantify impacts to pinniped populations from results recorded during OM02 and OM05 (such as mortalities, oiling, rescue and release counts) and undertake a desk-based assessment to infer potential impacts at species population levels.	SM07 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented if operational monitoring has: • As part of a pre-emptive assessment of receptor locations identified by time to hydrocarbon contact >10 days;	SM07 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Impacts to pinniped populations from hydrocarbon exposure have been quantified. • Recovery of pinniped populations has been evaluated.

Scientific monitoring Program (SMP)	Objectives	Activation Triggers	Termination Criteria
		• Identified shoreline contact of hydrocarbons ((at or above 0.5 g/m^2 surface, ≥5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m^2 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.	• 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) **SM10 - Assessment of physiological impacts important fish and shellfish species (fish health and seafood quality/safety) and recovery**	SM10 aims to assess any physiological impacts to important commercial fish and shellfish species (assessment of fish health) and if applicable, seafood quality/safety. Monitoring will be designed to sample key commercial fish and shellfish species and analyse tissues to identify fish health indicators and biomarkers, for example: • Liver Detoxification Enzymes (ethoxyresorufin-O-deethylase (EROD) activity) • PAH Biliary Metabolites • Oxidative DNA Damage • Serum SDH • Other physiological parameters, such as condition factor (CF), liver somatic index (LSI), gonado-somatic index (GSI) and gonad histology, total weight, length, condition, parasites, egg development, testes development, abnormalities. Seafood tainting may be included (where appropriate) using applicable sensory tests to objectively assess targeted finfish and shellfish species for hydrocarbon contamination. Results will be used to make inferences on the health of commercial fisheries and the potential magnitude of impacts to fishing industries.	SM10 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented if operational monitoring (OM01, OM02 and OM05) indicates the following: • The hydrocarbon spill will or has intersected with active commercial fisheries or aquaculture activities. • Commercially targeted finfish and/or shellfish mortality has been observed/recorded. • Commercial fishing or aquaculture areas have been exposed to hydrocarbons (≥0.5 g/m^2 surface and ≥5 ppb for entrained/dissolved hydrocarbons); and • Taste, odour or appearance of seafood presenting a potential human health risk is observed.	SM10 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Physiological impacts to important commercial fish and shellfish species from hydrocarbon exposure have been quantified. • Recovery of important commercial fish and shellfish species from hydrocarbon exposure has been evaluated. • Impacts to seafood quality/safety (if applicable) have been assessed and information provided to the relevant persons/ organisations and regulators for the management of any impacted fisheries. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.

Activation Triggers and Termination Criteria

Scientific monitoring program activation

The Woodside oil spill scientific monitoring team will be stood up immediately with the occurrence of a hydrocarbon spill (actual or suspected) Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors via the First Strike plan for the petroleum activity programme. The presence of any level of hydrocarbons in the marine environment triggers the activation of the oil spill scientific monitoring program (SMP). This is to 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), 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 which SMPs are activated, and the 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, AMPs 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). Stakeholder identification, planning and engagement will be managed by Woodside's Reputation Functional Support Team (FST) and follow the stakeholder management FST guidelines. These guidelines outline the FST roles and

responsibilities, competencies, persons/ organisations 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 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 World Heritage Area (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).

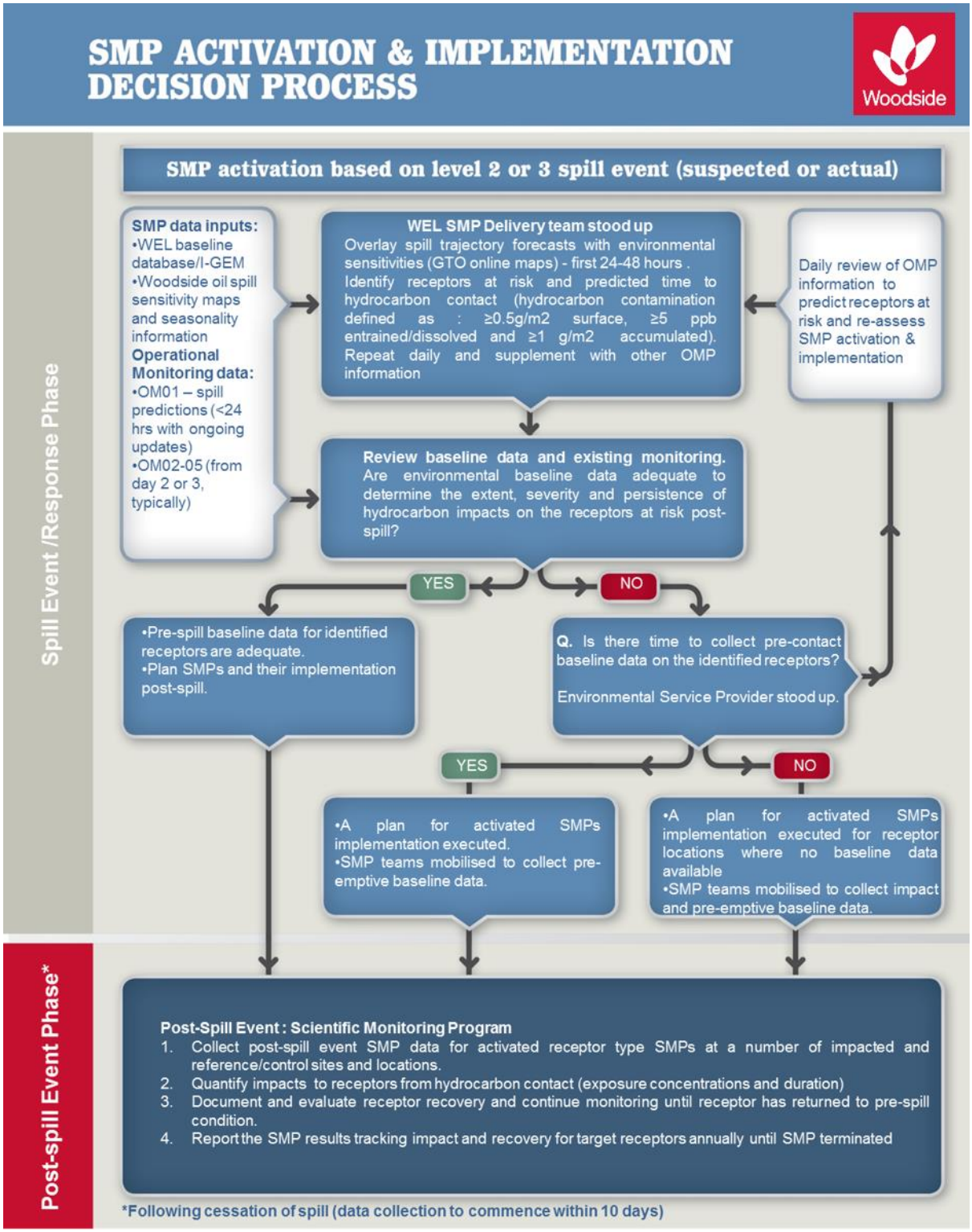


Figure C-2: Activation and Implementation Decision-tree for Oil Spill Environmental Monitoring

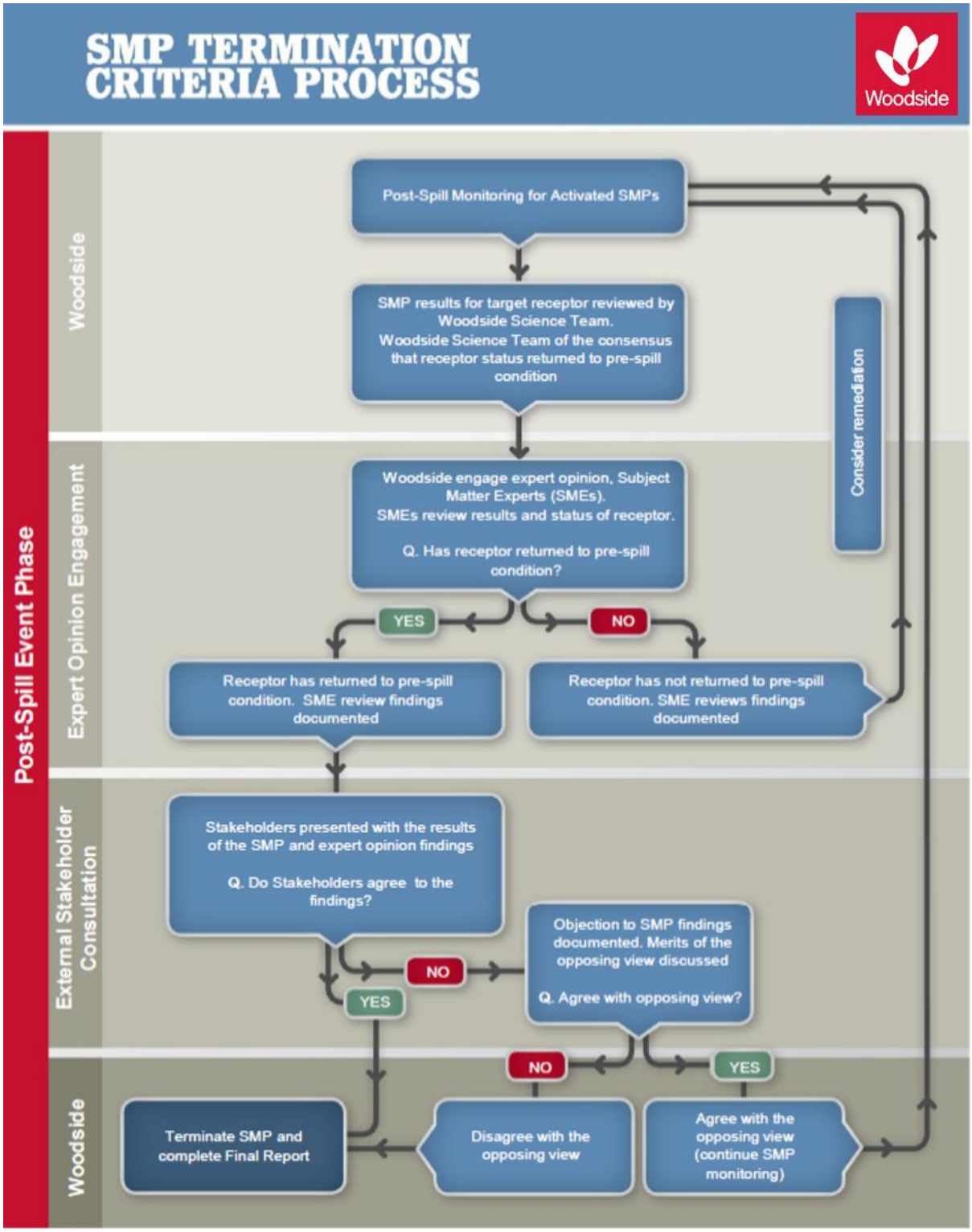


Figure C-3: Termination Criteria Decision-tree for Oil Spill Environmental Monitoring

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 the contracted SMP standby, 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)[30] in 2020. The Index of Marine Surveys for Assessments (IMSA) is an online portal to 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, 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.

[30] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

ANNEX D: SCIENTIFIC 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 EMBA for CS-01 and CS-02 (Table 2-1)

Receptors to be Monitored	Applicable SMP	Receptor Areas - Potential Impact and Reference Scientific Monitoring Sites (marked X)																																						
		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 Reserves)	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			
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	
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
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
Fish Assemblages	SM09	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Socio-economic																																								
Fisheries - Commercial	SM10		x	x	x	x	x	x	x	x	x	x										x	x	x	x			x	x	x		x	x	x	x	x	x	x	x	x
Fisheries - Traditional	SM10															x	x	x									x													x	
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

	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 Basline 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	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara 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. 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 7. Allen Coral Atlas	1. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	Barrow Island: East and West Coast baseline and monitoring for soft sediment, limestone pavement and coral assemblages (Chevron) Barrow, Montebello and Lowendal Islands: 1. Benthic community monitoring as part of DBCA Western Australian Marine Monitoring Program (2015-ongoing). 2. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	Coral Reefs & Filter Feeders 1. Montebello Marine Park, 2019, Identification and qualitative descriptions of benthic habitat. 2. Montebello Australian Marine Parks – 2019 – Baseline survey on benthic habitats. 3. Pluto Trunkline within Montebello Marine Park – Monitoring marine communities.	1. 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)
		Methods:				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
		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. 7. Combination of satellite imagery analysis and mapped/monitored areas.	1. Towed video transects, photo quadrats using towed video system. 2. Towed video transects, photo quadrats using towed video system. 3. Towed video transects, photo quadrats using towed video system. 4. Towed video transects, photo quadrats using towed video system.	Barrow Island: Coral habitat – mapping, rapid visual assessment, size-class frequency, photoquadrats – live coral cover and survival, tagged corals – growth and survival and coral recruitment Benthic macro-invertebrate surveys – video belt transects Barrow, Montebello and Lowendal Islands: 1. Fixed long-term monitoring sites. Diver video transect. 2. Towed video, benthic trawl and sled.	1.ROV Transects 2. Benthic habitat mapping, multibeam acoustic swathing. 3. ROV video.	1. ROV transects 2. ROV transects and driver surveys 3. Towed video, benthic trawl and sled.
		References and Data:				
		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 – HyVista Corporation – April and May 2006 (Kobryn et al. 2013 and 2022) https://allencoralatlas.org/atlas/#7.58/-21.5563/114.9133 (accessed 18/05/2022)	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 and Jones et al. 2021. DATAHOLDER: AIMS	Barrow Island: Chevron Australia (2015a and b) DATAHOLDER: Chevron Australia Barrow, Montebello and Lowendal Islands: 1. WA Department of Biodiversity, Conservation and Attractions (DBCA) DATAHOLDER: DBCA 2. Pitcher et al. 2016 DATAHOLDER: CSIRO	1. Advisian 2019 2. Keesing 2019 3. McLean et al. 2019	1. Chevron 2010. DATAHOLDER: Chevron. 2. Quadrant Energy/Santos 2016 DATAHOLDER: Santos 3. CSIRO (2013; 2016). DATAHOLDER: CSIRO
	SM03	**Studies:**				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
Benthic Habitat (Seagrass and Macro-algae)	Quantitative assessment using image capture using either diver held camera or towed video. Post analysis into broad groups based on taxonomy and morphology.	1. Quantitative descriptions of Ningaloo sanctuary zones habitat 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). 5. Combination of satellite imagery analysis and mapped/monitored areas		Barrow Island: East Barrow Island – Chevron baseline and monitoring	N/A – see Table D-1	
		Methods:				
		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. 5.Satellite imagery, mapping and monitoring		East Barrow- seagrass photoquadrats (30 m transects) during spring/summer and winter periods Macroalgae photoquadrats, visual census and biomass and specimen sampling		
		References and Data:				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
		1. Cassata and Collins 2008.DATAHOLDER: Curtin University – Applied Geology. 2. CSIRO – Ningaloo Outlook Program 3. AIMS - AIMS (2010) - http://www.aims.gov.au/creefs 4. Murdoch University - HyVista Corporation – April and May 2006 (Kobryn et al. 2013 and 2022) https://allencoralatlas.org/atlas/#7.58/-21.5563/114.9133 (accessed 18/05/2022)		Barrow Island: Chevron Australia (2015a and b) DATAHOLDER: Chevron Australia		
Benthic Habitat (Deeper Water Filter Feeders)	**SM03** Quantitative assessment using image capture using towed video. Post analysis into broad groups based on taxonomy and morphology.	**Studies:**				
		1. WAMSI 2007 deep-water Ningaloo benthic communities' study, Colquhoun and Heyward (2008). 2. CSIRO/BHP Ningaloo Outlook Program - Deep reef themes 2020	As above (SM03 Coral Reefs)		As above (SM03 Coral Reefs)	
		Methods:				
		1. Towed video and benthic sled (specimen sampling). 2. Side-scan sonar and AUV transects.				
		References and Data:				
		1. Colquhoun and Heyward (eds) 2008. DATAHOLDER: WAMSI, AIMS. 2. CSIRO – Ningaloo Outlook 2020				
	SM04	**Studies:**				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
Mangroves and Saltmarsh	Aerial photography and satellite imagery will be used in conjunction with field surveys to map the range and distribution of mangrove communities.	1. Atmospheric corrected 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.	N/A – See Table D-1	Barrow Island: East and West Coast baseline and monitoring - mapping (HR aerial imagery) and vegetation surveys	N/A – see Table D-1	
		Methods:				
		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.		Barrow – Chevron (2015a and b) – HR mapping (aerial images) and vegetation surveys using belt transects – species composition, estimated total canopy cover, total number of trees, pneumatophore density and canopy density.		
		References and Data:				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
		1. EOMAP 2017 DATAHOLDER: Woodside. 2. AAM 2014. Dataholder: Woodside 3. Kobryn et al. 2013 and 2022. DATAHOLDER: Murdoch University, AIMS; Woodside. 4. Joint Carnarvon Basin Operators, 2012. DATAHOLDER: Woodside and Apache Energy Ltd. 5. http://data.unep-wcmc.org/		Barrow Island: Chevron Australia (2015a and b) DATAHOLDER: Chevron Australia		
Seabirds	**SM05** Visual counts of breeding seabirds, nest counts, intertidal bird counts at high tide.	**Studies:**				
		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	N/A – See Table D-1	Barrow Island: Barrow Island Seabird Monitoring Program (Chevron) Barrow, Montebello and Lowendal Islands: 1. Johnston et al (2013) general inventory and distribution for the Pilbara region (WA Museum) 2. Santos – Integrated Shearwater Monitoring Program (1994-2016) 3. Santos – monitoring of seabird breeding colonies throughout the Lowendal Group of Islands.	N/A – see Table D-1	
		Methods:				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
		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).		Barrow Island – 2008-ongoing annual surveys: abundance, nest density, presence/absence of egg or chick/fledgling Barrow, Montebello and Lowendal Islands: 1. Desktop review (WA Museum) 2. Nest burrow density, presence/absence of eggs or chicks in burrows 3. The distribution and abundance of other nesting seabirds within the Lowendal Island group, including up to 45 islands and islets		
		References and Data:				
		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		Barrow – Chevron (2015c) DATAHOLDER: Chevron Australia Barrow, Montebello and Lowendal Islands: 1. Johnston et al (2013) DATAHOLDER: (WA Museum 2. Santos DATAHOLDER: Santos 3. Surman and Nicholson (2012) DATAHOLDER: Santos		
Turtles	**SM06**	**Studies:**				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
	Beach surveys (recording species, nests, and false crawls).	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	N/A – See Table D-1	Barrow Island: Chevron Australia: long term monitoring programs for flatback turtles Barrow, Montebello and Lowendal Islands: 1. Marine turtle monitoring as part of DBCA long-term turtle monitoring program (ongoing). 2. LTM Study of Green, Flatback, Hawksbill turtles on beaches within the Barrow, Lowendal and Montebello Island Complex. 3. Santos 2013 turtle nesting survey on the Lowendal islands. 4. Varanus Island Turtle monitoring program (2005 – present). North West Shelf Flatback Conservation Program – conserve North West Shelf stock – scope covers all summer nesting flatback turtles - https://flatbacks.dbca.wa.gov.au/about	N/A – see Table D-1	
		Methods:				
		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.		Barrow Island – Chevron Australia: 2005 - ongoing annual surveys, flatback turtles – nesting success, track counts and satellite tracking, hatchling survival and dispersal. Barrow, Montebello and Lowendal Islands: 1. Nesting demographics 2. Nesting demographics 3. Tagging and nest counts 4. Tagging and nest counts at Varanus, Beacon, Bridled, Abutilon and Parakeelya islands. North West Shelf Flatback Conservation Program - https://flatbacks.dbca.wa.gov.au/program-activities		

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
		References/Data:				
		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		Barrow Island – Chevron (2015c) DATAHOLDER: Chevron Australia Barrow, Montebello and Lowendal Islands: 1. DBCA 2. Pendoley 2005. AMOSC/DBCA (DPaW) 2014. 3. Santos (2014) DATAHOLDER: Santos 4. Santos (2005-prsesent) DATAHOLDER: Santos North West Shelf Flatback Conservation Program - https://flatbacks.dbca.wa.gov.au/program-activities		
Fish	**SM09**	**Studies:**				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
	Baited Remote Underwater Video Stations (BRUVS), Visual Underwater Counts (VUC), Diver Operated Video (DOV).	1. AIMS/DBCA 2014 Baseline Ningaloo Survey – repeat an expansion on the LTM (Co-funded survey: Woodside and AIMS). 2. Demersal fish populations – baseline assessment (AIMS/WAMSI). 3. DBCA study measured Species Richness, Community Composition, and Target Biomass, through UVC. BRUVS studies determining max N, Species Richness, and Biomass. 4. Pilbara Marine Conservation Partnership Stereo BRUVS in shallow water (~10m) in 2014 in northern region of the Ningaloo Marine Park, in shallow water (~10m) inside the lagoonal reef of the Ningaloo Marine Park in 2016, in deep water (~40m) across the length of the Ningaloo Marine Park in 2015, in shallow water outside of Ningaloo Reef from Waroora to Jurabi in 2015 and offshore of the Muiron Islands in 2015. 5. Elasmobranch faunal composition of Ningaloo Marine Park. 6. Juvenile fish recruitment surveys at Ningaloo reef. 7. Demersal fish assemblage sampling method comparison 8. Ningaloo Outlook (CSIRO) - Shallow and Deep Reefs Program	1. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	Barrow Island: Chevron: East and West Coast intertidal and subtidal baseline and monitoring Barrow, Montebello and Lowendal Islands: 1. Pilbara Marine Conservation Partnership Stereo BRUVS drops in shallow water (~10m) from Exmouth to Barrow Islands in 2015. 2. Finfish monitoring as part of DBCAs Western Australian Marine Monitoring Program (2015-ongoing).	1. CSIRO – Fish Diversity. 2. Fish species richness and abundance.	
		Methods:				

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Ningaloo Coast and the Muiron Islands	Rankin Bank & Glomar Shoal	Barrow, Montebello and Lowendal Islands	Montebello AMP	Southern Pilbara Islands
		1. UVC surveys. 2. BRUVS Study with 304 video samples at three specific depth ranges (1-10 m, 10-30 m and 30-110m). 3. UVC surveys. 4. Stereo BRUVS 5. Snorkel and Scuba surveys. 5. Underwater visual census. 6. Diver operated video. 7. Diver UVC. 8. Diver UVC, stereo BRUVs	1. BRUVs. 2. BRUVs. 3. BRUVs. 4. BRUVs.	Barrow Island – Chevron (2015a and b) – demersal fish: stereo BRUVS (subtidal habitats) and netting combination for mangrove habitat Barrow, Montebello and Lowendal Islands: 1. Stereo BRUVS. 2. Diver underwater visual surveys (UVS)	1. Semi V Wing trawl net or an epibenthic sled. 2. ROV Video.	
		References/Data:				
		1. AIMS 2014. DATAHOLDER: AIMS/Woodside. 2. Fitzpatrick et al. 2012. DATAHOLDERS: WAMSI, AIMS. 3. DBCA unpublished data. DATAHOLDER: DBCA/AIMS. 4. CSIRO Data DATAHOLDER: CSIRO Data Centre ([redacted]). 5. Stevens, J.D., P.R., White, W.T., McAuley, R.B., Meekan, M.G. 2009. 6. WAMSI unpublished data DATAHOLDER: AIMS 7. DATAHOLDER: WAMSI 8. CSIRO – Ningaloo Outlook 2020.	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 and Jones et al. 2021. DATAHOLDER: AIMS	Barrow Island – Chevron Australia (2015a and b) DATAHOLDER: Chevron Barrow, Montebello and Lowendal Islands: 1. Unpublished report CSIRO DATAHOLDER: CSIRO, CSIRO Data centre ([redacted]) 2. DBCA	1. Keesing 2019. 2. McLean et al. 2019.	

References

Astron Environmental Service (2014). Exmouth Islands Turtle Monitoring Program January 2014 Field Survey. Report prepared on behalf of Apache Energy/Quadrant Energy (now Santos).

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

Advisian (2019) Montebello Marine Park Benthic Habitat Survey ROV Analysis of the Scarborough Pipeline Route. Report Prepared for Woodside Energy Ltd. 183 pp.

AIMS (2010) Reefs: Ningaloo Reef Biodiversity Expeditions (2008-2010). http://www.aims.gov.au/creefs

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.).

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

AMOSC/DPAW (2014). Inter-Company Oil Spill Wildlife Response Plan – Pilbara region. pp. 272 http://www.dpaw.wa.gov.au/images/documents/conservation-management/marine/wildlife/PROWRP_20141103.pdf

Babcock R, Donovan A, Collin S and Ochieng-Erftemeijer C (2017). Pilbara Marine Conservation Partnership – Final Report – Volume 2 (Part III: Coral Reef Health). CSIRO Oceans & Atmosphere, Published Brisbane. https://research.csiro.au/pmcp/pmcp-publications/

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 (2015a). Gorgon Gas Development and Jansz Feed Gas Pipeline: Coastal and Marine Baseline State and Environmental Impact Report. East Coast. Document Number: G1-NT-REPX0001838. Pp. 408. https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-emp-coastal-and-marine-environmental-report.pdf

Chevron Australia (2015b). Gorgon Gas Development and Jansz Feed Gas Pipeline: Coastal and Marine Baseline State and Environmental Impact Report. West Coast. Document Number: G1-NT-REPX0002749. Pp. 255. https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-emp-coastal-and-marine-environmental-report-gps-and-sc.pdf

Chevron (2015c). Gorgon Gas Development and Janz Feed Gas Pipeline: Five year Environmental Performance Report (August 2010-August 2015). Document Number: G1-NT-REPX0007517. Pp.287. https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-emp-coastal-and-marine-environmental-report.pdf

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.

[DBCA] Department of Biodiversity, Conservation and Attractions. North West Shelf Flatback Conservation Program. https://flatbacks.dbca.wa.gov.au/program-activities (accessed October 2022).

[DBCA] Department of Biodiversity, Conservation and Attractions (2019). Ningaloo Marine Park Monitoring 2018-19 [unpublished internal report], Department of Biodiversity, Conservation and Attractions, Perth.

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

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).

Jones, R., M. Wakeford, L. Currey-Randall, K.Miller and H. Tonin (2021). Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172:112717 https://doi.org/10.1016/j.marpolbul.2021.112717 .

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

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

Kobryn, H.T., Beckley, L.E. and Wouters, K. (2022). Bathymetry derivatives and habitat data from hyperspectral imagery establish a high-resolution baseline for managing Ningaloo Reef, Western Australia. Remote Sensing 14: 1827.

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.

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

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.

Santos (Quadrant Energy) (2014). Seabird Monitoring - Lowendal, Airlie, Serrurier islands - 1994 to present. Industry-Government Environmental Meta-database (IGEM). UUID: bdd428fe-cf24-4596-a822-cd578695ee16. Accessed June 2017

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

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.

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.

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
Montebello Island - Champagne Bay and Chippendale channel
Montebello Island - Claret Bay
Montebello Island - Hermite/Delta Island Channel
Montebello Island - Hock Bay
Montebello Island - North and Kelvin Channel
Montebello Island - Sherry Lagoon Entrance
Withnell Bay
Holden Bay
King Bay
No Name Bay / No Name Beach
Enderby Is -Dampier
Rosemary Island - Dampier
Legendre Is - Dampier
Karratha Gas Plant
KGP to Whitnell 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. NOPSEMA REPORTING FORMS

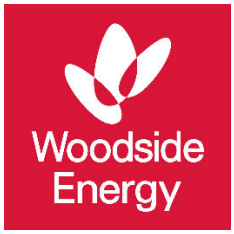
NOPSEMA Recordable Environmental Incident monthly Reporting Form

https://www.nopsema.gov.au/assets/Forms/A198750.doc

Report of an accident, dangerous occurrence or environmental incident

https://www.nopsema.gov.au/assets/Forms/N-03000-FM0831-Report-of-an-Accident-Dangerous-Occurrence-or-Environmental-Incident-Rev-8-Jan-2015-MS-Word-2010.docx

APPENDIX F. STAKEHOLDER CONSULTATION



Appendix F – Julimar Appraisal Drilling and Survey Environment Plan

Date: April 2023

Revision: 0

TABLE OF CONTENTS

1. Consultation

1.1 Email sent to Australian Border Force (ABF), Department of Industry, Science and Resources (DISR), Department of Biodiversity, Conservation and Attractions (DBCA), Department of Mines, Industry Regulation and Safety (DMIRS), Department of Transport (DoT), Australian Petroleum Production and Exploration Association (APPEA), Recfishwest, Marine Tourism WA, WA Game Fishing Association, Karratha Charter Boat, Tourism and Dive Operators (16 August 2022)

Dear Stakeholder

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risks and associated management measures. The Information Sheet is also available on our website.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well, if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Feedback:

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.2 Email sent to Australian Fisheries Management Authority (AFMA) (16 August 2022)

Dear AFMA

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for the proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries
The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries
The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)
- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities
The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website) is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery

Exclusionary/Cautionary Zone:

- An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.
- A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location.
- A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.

Vessels:

- MODU
- General supply/support vessels
- Survey / AHT vessel

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure	Physical presence of infrastructure on seafloor causing interference or displacement	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and, government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities Wellhead location will be marked on marine charts
Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	All routine marine discharges will be managed according to legislative and regulatory requirements
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users

		Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area via vessels ballast water or biofouling	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species Compliance with Australian biosecurity requirements and guidance

Feedback:

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.3 Email sent to Australian Hydrographic Office (AHO) and Australian Maritime Safety Authority (AMSA) – Marine Safety (16 August 2022)

Dear AHO / AMSA

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An information sheet (also on our website), and shipping lane map is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m

Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Feedback:
If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.4 Email sent to Australian Maritime Safety Authority (AMSA) – Marine Pollution (20 September 2022)

Hi [redacted]

As part of Woodside's ongoing consultation for its current and planned activities, I would like to advise WA Department of Transport (DoT) that Woodside is preparing the Julimar Appraisal Drilling and Survey Environment Plan (EP). Woodside is planning to drill one new appraisal-keeper well, JULA-P, to inform future development of the Julimar field. The

activities will be undertaken in Commonwealth waters around 160 km north-west of Dampier in title area WA-49-L. The JULA-P well will be located at approximately 163 m water depth. Geotechnical and geophysical surveys are also included in the scope of the proposed EP to support JULA-P well activities and future drilling mooring designs. Activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Woodside would like to offer DoT the opportunity to review or provide comment on the activity.

Information is presented as follows:

- A Consultation Information Sheet is available on our website here, providing information on the proposed activities.
- The Julimar Appraisal Drilling and Survey Oil Pollution First Strike Plan is attached. This will form part of the approval submission in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).

Woodside anticipates submitting the proposed EP in November 2022 to support these activities.

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977 by COB 28 October 2022.

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.

Many thanks,

[redacted]

1.5 Email sent to Department of Climate Change, Energy, the Environment and Water (DCCEEW) (16 August 2022)

Dear Department of Climate Change, Energy, the Environment and Water

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries

The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries

The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)
- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website) is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Biosecurity:

With respect to the biosecurity matters, please note the following information below:

Environment description:

Water depths across both the JULA-P well drilling Operational Area and the geophysical and geotechnical survey Operational Area are range from 130 m to 240 m. The proposed JULA-P well will be located at approximately 163 m water depth. Both Operational Areas

traverse the Northwest Province and the Northwest Shelf Province and are located across the outer continental shelf.

The seabed of the Operational Area is characterised by a gentle northwest facing slope that steepens over the shelf break region to the northwest. The JULA-P well drilling Operational Area is relatively flat, while the topography over the geophysical and geotechnical survey Operational Area is highly variable.

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.

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure	Physical presence of infrastructure on seafloor causing interference or displacement	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and, government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities Wellhead location will be marked on marine charts
Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result	All routine marine discharges will be managed according to legislative and regulatory requirements

	in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area via vessels ballast water or biofouling	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species Compliance with Australian biosecurity requirements and guidance

Feedback:

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.6 Email sent to Department of Defence (16 August 2022)

Dear Department of Defence

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An information sheet (also on our website), and defence zone map is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Feedback:

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.7 Email sent to Director of National Parks (16 August 2022)

Dear Director of National Parks

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

Proposed activities

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

Australian Government Guidance

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 closest point of the proposed Operational Areas located approximately 16 km northwest of the Montebello Marine Park – Multiple Use Zone (Cwlth).
- 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.
- In the unlikely event of a loss of hydrocarbons, the worst case credible spill scenario assessed for this activity a loss of well integrity. For this consequence to occur, there must be a failure of multiple physical and procedural barriers within the well relevant to the activity. Given the controls in place to prevent and control loss of well control events and mitigate their consequences, it is considered that the risk associated with a loss of well integrity is managed to as low as reasonably practical. In the unlikely event of a loss of well integrity, there is a risk of condensate entering the:
    - Abrolhos Islands Marine Park
    - Argo-Rowley Terrace Marine Park
    - Ashmore Reef Marine Park
    - Cartier Island Marine Park

  - Kimberley Marine Park
  - Rowley Shoals – Mermaid Reef Marine Park
  - Carnarvon Canyon Marine Park
  - Dampier Marine Park
  - Jurien Marine Park
  - Perth Canyon Marine Park
  - South West Corner Marine Park
  - Two Rocks Marine Park
  - Gascoyne Marine Park
  - Montebello Marine Park
  - Shark Bay Marine Park
- 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 background on the proposed activity, including a summary of potential key risks and associated management measures. The Information Sheet is also available on our website.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).

Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Feedback:
If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.8 Email sent to Department of Primary Industries and Regional Development (DPIRD) (16 August 2022)

Dear [redacted]

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries
The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries

The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)
- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		

Physical presence of infrastructure	Physical presence of infrastructure on seafloor causing interference or displacement	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and, government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities Wellhead location will be marked on marine charts
Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	All routine marine discharges will be managed according to legislative and regulatory requirements
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area

Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area via vessels ballast water or biofouling	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species Compliance with Australian biosecurity requirements and guidance

Feedback:
If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.9 Email sent to Department of Transport (20 September 2022)

Hi [redacted]

As part of Woodside's ongoing consultation for its current and planned activities, I would like to advise WA Department of Transport (DoT) that Woodside is preparing the Julimar Appraisal Drilling and Survey Environment Plan (EP). Woodside is planning to drill one new appraisal-keeper well, JULA-P, to inform future development of the Julimar field. The activities will be undertaken in Commonwealth waters around 160 km north-west of Dampier in title area WA-49-L. The JULA-P well will be located at approximately 163 m water depth. Geotechnical and geophysical surveys are also included in the scope of the proposed EP to support JULA-P well activities and future drilling mooring designs. Activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Woodside would like to offer DoT the opportunity to review or provide comment on the activity.

Information is presented as follows:

- A Consultation Information Sheet is available on our website here, providing information on the proposed activities.
- The Julimar Appraisal Drilling and Survey Oil Pollution First Strike Plan is attached. This will form part of the approval submission in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).
- In the table below, as requested in the Offshore Petroleum Industry Guidance Note (July 2020) and from recent engagement activities between DoT and Woodside, responses to the information requirements in a succinct summary and source of information.

Woodside anticipates submitting the proposed EP in November 2022 to support these activities.

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977 by COB 28 October 2022.

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).

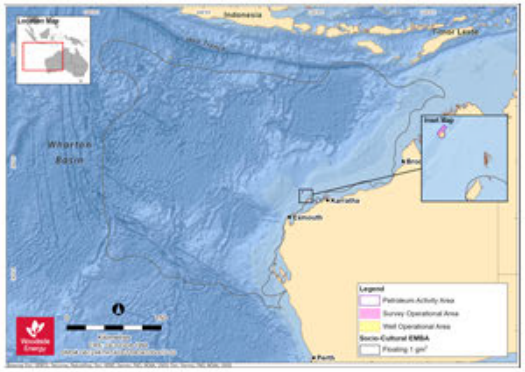
Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

<table>
<tr><th>Information Requested in the Offshore Petroleum Industry Guidance Note (July 2020)</th><th>Information Provided & Reference</th></tr>
<tr><td>Description of activity, including the intended schedule, location (including coordinates), distance to nearest landfall and map.</td><td>Included in the consultation information sheet</td></tr>
<tr><td>Worst case spill volumes.</td><td>Included in Appendix A of the First Strike Plan</td></tr>
<tr><td>Known or indicative oil type/properties.</td><td>Included in Appendix A of the First Strike Plan</td></tr>
<tr><td>Amenability of oil to dispersants and window of opportunity for dispersant efficacy.</td><td>Dispersant is not deemed suitable for spill of Julimar Condensate due to the highly volatile characteristics and low residue of 0.4%. Additionally, modelling predicts limited presence of floating hydrocarbons at feasible response thresholds of >50 g/m^2. Surface dispersant is also not deemed to be suitable for spills of marine diesel oil (MDO).</td></tr>
<tr><td>Description of existing environment and protection priorities.</td><td>Included in Section 3 of the First Strike Plan</td></tr>
<tr><td>Details of the environmental risk assessment related to marine oil pollution - describe the process and key outcomes around risk identification, risk analysis, risk evaluation and risk treatment. For further information see the Oil Pollution Risk Management Information Paper (NOPSEMA 2021).</td><td>Unplanned loss of containment events from the Petroleum Activities Program have been identified during the risk assessment process (presented in 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. Two unplanned events or credible spill scenario for the Petroleum Activities Program have been selected as representative across types, sources and incident/response levels, up to and including the WCCS.

Table 2-1 of the OSPRMA and Appendix A of the First Strike Plan present the credible scenarios for the Petroleum Activities Program. Two worst-case credible scenarios (CS-01 – LOWC (Julimar Condensate) and CS-02 – vessel collision (MDO)) have been used for response planning purposes for the activity as all other scenarios are of a lesser scale and extent. By demonstrating capability to meet and manage events of this size and timescale, Woodside assumes relevant scenarios that are smaller in nature and scale can also be managed by the same capability.

Response performance outcomes have been defined based on a response to the WCCS.</td></tr>
<tr><td>Outcomes of oil spill trajectory modelling, including predicted times to enter State waters and contact shorelines.</td><td>
Credible Scenario-01 (CS-01) – Loss of well containment at JULA-P well (Julimar Condensate)
Instantaneous release of 91,000 m^3. 0.4% residue of 364 m^3
Modelling for a LOWC from JULA-K well, 2 km from JULA-P well and within the same title (WA-5-L), was undertaken in 2019 and reprocessed later in 2019 using NOPSEMA's contemporary modelling thresholds. JULA-P Appraisal Drilling LOWC is expected to be circa 65% smaller (91,000 m^3) than the JULA-K LOWC volume (269,898 m^3), has the same residue, occurs in the same water depths and both over a 77-day release period. Given that JULA-P spill parameters and geographic location fall within the envelope of JULA-K, the existing modelling is an appropriate surrogate and therefore additional modelling was not required.

Minimum time to shoreline contact (above 100 g/m^2) in days – based on deterministic modelling
Ningaloo Coast Middle World Heritage Area — 2 m^3, 18.4 days
Kimberley Coast & Northern Coast — 38 m^3, 63 days
Eighty Mile Beach — 36 m^3, 63 days
Eighty Mile Beach Marine Park and Ramsar Site — 5 m^3, 71.2 days

Stochastic modelling for the above scenario was undertaken by RPS in March 2019 and reprocessed at lower entrained/dissolved thresholds later on in 2019. EMBA maps for the LOWC scenario were not created when the original modelling was reprocessed. The below figure shows a smoothed EMBA of floating oil concentrations at or above 1 g/m^2 created by Woodside:

From the reprocessed results tables, the following State waters receptors are predicted to be contacted by floating hydrocarbons at 1 g/m^2 within the first month:
</td><td>
Credible Scenario-02 (CS-02) – loss of containment due to vessel collision
Instantaneous release of 500 m^3. 5% residue of 25 m^3
Loss of marine vessel separation MDO modelling of 2000 m^3 was available for the JULA-K well location, 2 km from JULA-P well and within the same title (WA-5-L). It was originally undertaken in 2019 and reprocessed later in 2019 using NOPSEMA's contemporary modelling thresholds. The largest tank of the vessel proposed for the JULA-P Well Intervention activity is circa 75% smaller (500 m^3) than the modelled MDO volume (2000 m^3). Given that spill parameters and geographic location fall within the envelope of the existing MDO modelling, it is an appropriate surrogate and therefore additional modelling was not required.

Minimum time to shoreline contact (above 100 g/m^2) in days
No contact at response thresholds

Stochastic modelling for the above scenario was undertaken by RPS in March 2019 and reprocessed at lower entrained/dissolved thresholds later on in 2019. EMBA maps for the diesel scenario were not created when the original modelling was reprocessed.

From the reprocessed results tables, the only receptor predicted to be contacted by floating hydrocarbons at 1 g/m^2 is Montebello Marine Park after 3 hours.
</td></tr>
</table>

Details on initial response actions and key activation timeframes.	Included in Section 2 of the First Strike Plan
Potential Incident Control Centre arrangements.	Included in Appendix D and E of the First Strike Plan
Potential staging areas / Forward Operating Base.	A Forward Operating Base can be established at Exmouth and/ or Dampier.
Details on response strategies.	Included in Section of the First Strike Plan
Use of DoT equipment resources	Woodside has access to its own and contracted stockpiles of response equipment and acknowledges that potential use of DoT resources cannot be assumed and is at the discretion of DoT.
Details and diagrams on proposed IMT structure including integration of DoT arrangements as per this IGN.	Included in Appendix D and E of the First Strike Plan
Details on testing of arrangements of OPEP/OSCP.	• Level 1 Response – 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. • Level 2 Response – A minimum of one Emergency Management exercise per MODU per campaign [Note: must be conducted within one month of campaign commencing and at least one Level 2 exercise per 6 month hire period]. • Level 3 Response – 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. **Testing of Oil Spill Response Arrangements** 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. Woodside's Testing of Arrangements Schedule aligns with international good practice for spill preparedness and response management; the testing is compatible with the IPIECA Good Practice Guide and the Australian Institute for Disaster Resilience (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. The hydrocarbon spill arrangements included within 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. 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 within the schedule, up to eight formal exercises are planned annually, across Woodside, to specifically test arrangements for responding to a hydrocarbon spill to the marine environment. 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).
Additional comments	Please note some of the links in the document are still being finalised, and as such may show a reference error in the attached version.

Many thanks

[redacted]

1.10 Email sent to Pilbara Trap Fishery (6 Licence Holders) and Pilbara Line Fishery (9 Licence Holders) (16 August 2022)

Dear Fishery Stakeholder

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries
The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries
The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)
- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities
The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery

Exclusionary/Cautionary Zone:

- An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.
- A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location.
- A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.

Vessels:

- MODU
- General supply/support vessels
- Survey / AHT vessel

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure	Physical presence of infrastructure on seafloor causing interference or displacement	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and, government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities Wellhead location will be marked on marine charts
Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	All routine marine discharges will be managed according to legislative and regulatory requirements
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users

		Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area via vessels ballast water or biofouling	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species Compliance with Australian biosecurity requirements and guidance

Feedback:

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.11 Letter sent to Pilbara Crab Fishery (1 Licence Holder) (16 August 2022)

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

16 August 2022

Dear Pilbara Crab Fishery

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries
The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries
The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)
- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities
The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of	Physical presence of infrastructure on seafloor causing interference or	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and,

infrastructure	displacement	government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities Wellhead location will be marked on marine charts
Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	All routine marine discharges will be managed according to legislative and regulatory requirements
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area via vessels ballast water or biofouling	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species Compliance with Australian biosecurity requirements and guidance

Feedback:
If you have any feedback on these activities, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

Kind regards,

Woodside Feedback

Woodside Energy
Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

Attached: Consultation Information Sheet, relevant fisheries map

1.12 Letter sent to Mackerel Managed Fishery (Area 2) (23 Licence Holders) (16 August 2022)

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

16 August 2022

Dear Mackerel Managed Fishery

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries
The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries
The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)
- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities
The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of	Physical presence of infrastructure on seafloor causing interference or	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and,

infrastructure	displacement	government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities Wellhead location will be marked on marine charts
Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	All routine marine discharges will be managed according to legislative and regulatory requirements
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area via vessels ballast water or biofouling	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species Compliance with Australian biosecurity requirements and guidance

Feedback:
If you have any feedback on these activities, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

Kind 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

Attached: Consultation Information Sheet, relevant fisheries map

1.13 Email sent to Chevron Australia, Osaka Gas Gorgon, Tokyo Gas Gorgon and JERA Gorgon (16 August 2022)

Dear [redacted]

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. Some anchor lines may cross into Chevron operated title area WA-5-R. To manage this an ingress agreement (or similar) with Chevron will be completed prior to activity commencement. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P. To manage this an ingress agreement with Chevron will be completed prior to activity commencement.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

An information sheet (also on our website), and a Titleholder map is attached.

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. For your awareness, we have provided consultation information directly to Shell Australia, Mobil Australia Resources Company, KUFPEC Australia (Wheatstone lago), PE Wheatstone and Kyushu Electric Wheatstone.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).

Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Feedback:
If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.14 Email sent to Exxon Mobil Australia Resources Company, Shell Australia, KUFPEC Australia (Wheatstone Iago), PE Wheatstone, Kyushu Electric Wheatstone, Santos WA Northwest, Santos (BOL) (16 August 2022)

Dear Titleholder

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.

- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An information sheet (also on our website), and a Titleholder map is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.

Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Feedback:
If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.15 Email sent to Commonwealth Fisheries Association (CFA), Australian Southern Bluefin Tuna Industry Association (ASBTIA), Tuna Australia and Pearl Producers Association (PPA) (16 August 2022)

Dear Stakeholder

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for the proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries
The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries
The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)

- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website) is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:

- Anchor hold testing
- Drilling one new appraisal-keeper well, JULA-P
- Geotechnical and geophysical surveys
- P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)

Location:

- ~160 km north-west of Dampier

Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m
Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure	Physical presence of infrastructure on seafloor causing interference or displacement	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and, government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities

		Wellhead location will be marked on marine charts
Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	All routine marine discharges will be managed according to legislative and regulatory requirements
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment

Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area via vessels ballast water or biofouling	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species Compliance with Australian biosecurity requirements and guidance

Feedback:
If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.16 Email sent to Western Australian Fishing Industry Council (WAFIC) (16 August 2022)

Dear [redacted]

Woodside is planning to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

We are currently preparing an Environment Plan for the proposed activities and have undertaken an assessment of potential impacts to commercial fishers. We provide the following overview:

Commonwealth-managed fisheries
The following fisheries overlap with the proposed operational area, none of which are expected to be impacted given the nature of proposed activities, historic fishing location, fishing methods and water depth.

- Southern Bluefin Tuna Fishery
- Western Tuna and Billfish Fishery
- Western Skipjack Fishery

State-managed fisheries
The following fisheries overlap the proposed operational activity, with DPIRD FishCube data confirming recent fishing effort:

- Mackerel Managed Fishery (Area 2)
- Pilbara Crab Managed Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery

Proposed activities

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

Development of the JULA-P well is subject to future development decisions and environmental approvals.

- If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this Environment Plan (three years). P&A is currently contemplated in 2024 or 2025.
- If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future Environment Plan.

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities.

A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. This includes a 500 m safety exclusion zone around the MODU to manage vessel movements.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Please provide your views by **16 September 2022**.

Stakeholders will have an additional opportunity to comment via the NOPSEMA public comment period for proposed exploration activities. NOPSEMA will make the EP available for comment at https://info.nopsema.gov.au/home/open_for_comment.

Activity:

Summary:	• Anchor hold testing • Drilling one new appraisal-keeper well, JULA-P • Geotechnical and geophysical surveys • P&A of the JULA-P well if it's not developed at any point during the life of this EP (three years)
Location:	• ~160 km north-west of Dampier
Approx. Water Depth (m):	• Operational Area ~ 130-240 m • Proposed JULA-P well location ~ 163 m

Schedule:	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Duration:	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Relevant Fisheries:	• **Commonwealth:** None • **State:** Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Exclusionary/Cautionary Zone:	• An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	• MODU • General supply/support vessels • Survey / AHT vessel

Potential risks to commercial fishing and proposed mitigation measures:

Potential Risk/Impact	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure	Physical presence of infrastructure on seafloor causing interference or displacement	Consultation with relevant persons. For example, commercial fishers and their representative organisations, petroleum titleholders and, government departments and agencies to inform decision making for the proposed activity and development of the EP Notification to relevant stakeholders prior to the commencement of activities Wellhead location will be marked on marine charts

Marine discharges	Discharges from the operation of project vessels may include sewage, grey water, drain and bilge water, cooling water and brine. These discharges may result in a localised short-term reduction in water quality however they will be rapidly diluted and dispersed in the water column	All routine marine discharges will be managed according to legislative and regulatory requirements
Seabed disturbance	Disturbance to the seabed from activities	Attempted retrieval of dropped objects and temporary installation equipment.
Vessel interaction	The presence of vessels may preclude other marine users from access to the area	Navigation aids and practices will be used as required by Maritime Regulations to minimise potential impact on other marine users Notification to relevant fishery stakeholders and Government maritime safety agencies of specific start and end dates, specific vessel-on-location and any exclusion zones prior to commencement of the activity An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities A 4 km radius Operational Area will apply around the JULA-P well A temporary 500 m safety exclusion zone will apply around the MODU to manage vessel movements Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned		
Hydrocarbon release	Loss of hydrocarbons to the marine environment from a well or vessel collision resulting in a tank rupture	Appropriate spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Invasive Marine Species	Introduction or translocation and establishment of invasive marine species to the area	All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species

via vessels ballast water or biofouling	Compliance with Australian biosecurity requirements and guidance

Feedback:

If you have any feedback on these activities, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

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.

Please provide your views by **16 September 2022**.

1.17 Woodside Consultation Information Sheet (sent to all relevant persons)

Woodside Energy

STAKEHOLDER CONSULTATION

INFORMATION SHEET

August 2022

JULIMAR APPRAISAL DRILLING AND SURVEY ENVIRONMENT PLAN (EP)

CARNARVON BASIN, NORTH-WEST AUSTRALIA

Proposed Activity

Drilling

Woodside is planning to drill one new appraisal-keeper well, JULA-P, to inform future development of the Julimar field. The activity will target the deeper sands of the Julimar field to further understand reservoir properties, which is key to future development decisions.

Prior to drilling, anchor hold tests will occur around the JULA-P well location which involves lowering an anchor to the seabed and tensioning it to determine its holding ability. This process will be repeated multiple times and the anchor will be recovered after each test. Anchor hold tests will result in a minor, highly localised, disturbance to the seabed due to the small-scale nature of the activity.

The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Development of the JULA-P well is subject to future development decisions and environmental approvals. If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this EP (three years). If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP. The activities will be undertaken in Commonwealth waters around 160 km north-west of Dampier in title area WA-49-L. The JULA-P well will be located at approximately 163 m water depth.

Drilling is currently contemplated in Q2 2023, with contingent P&A activities in 2024 or 2025. However, drilling may be performed at any point within three years of EP acceptance.

Surveys

Geotechnical and geophysical surveys are also included in the scope of the proposed EP to support JULA-P well activities and future drilling mooring designs.

Geotechnical and geophysical surveys will involve seafloor sampling and scanning. Information from these surveys will inform safe and effective anchoring plans in future activities by better understanding seabed sediment characteristics in the area.

Activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP.

Project vessels

The proposed drilling, appraisal and suspension activities for the JULA-P well will be performed by a mobile offshore drilling unit (MODU). The project may be supported by general support vessels, including anchor handling vessel/s and survey vessel/s. A survey vessel or anchor handling tug (AHT) vessel will perform survey activities.

Drilling, appraisal and suspension activities are currently expected to take approximately 60 days to complete, and survey activities approximately 14 days to complete. It is anticipated that vessels will operate 24 hours per day for the duration of the activities.

In the event that well P&A is required, the activity will be performed using a MODU and is expected to take approximately 20 days to complete.

Communications with mariners

An approximate 50 km² Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well.

A 500 m safety exclusion zone will apply around the MODU 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 zone. The JULA-P well will be marked on navigational charts.

Background

Woodside Energy Julimar Pty Ltd (Woodside), is operator of the Julimar Field Production System in Title Areas WA-49-L, WA-26-PL and WA-29-PL. The system consists of subsea wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals.

The system produces gas and condensate from the Brunello and Julimar fields to the offshore Chevron-Operated Wheatstone platform. Gas and condensate from the Wheatstone Platform is then transported to the onshore Chevron-operated Wheatstone LNG facility for processing, storage and supply of LNG and condensate to customers. The system normally operates 24 hours per day, 365 days per year.

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, the intent is to minimise environmental and social impacts associated with the proposed activities, and we are seeking feedback or comments you may have to inform our decision making.

Joint Venture

Woodside is operator of on behalf of the Julimar joint venture participants. The participants are Woodside and KUFPEC Australia (Julimar) Pty Ltd.

We welcome your feedback by 16 September 2022

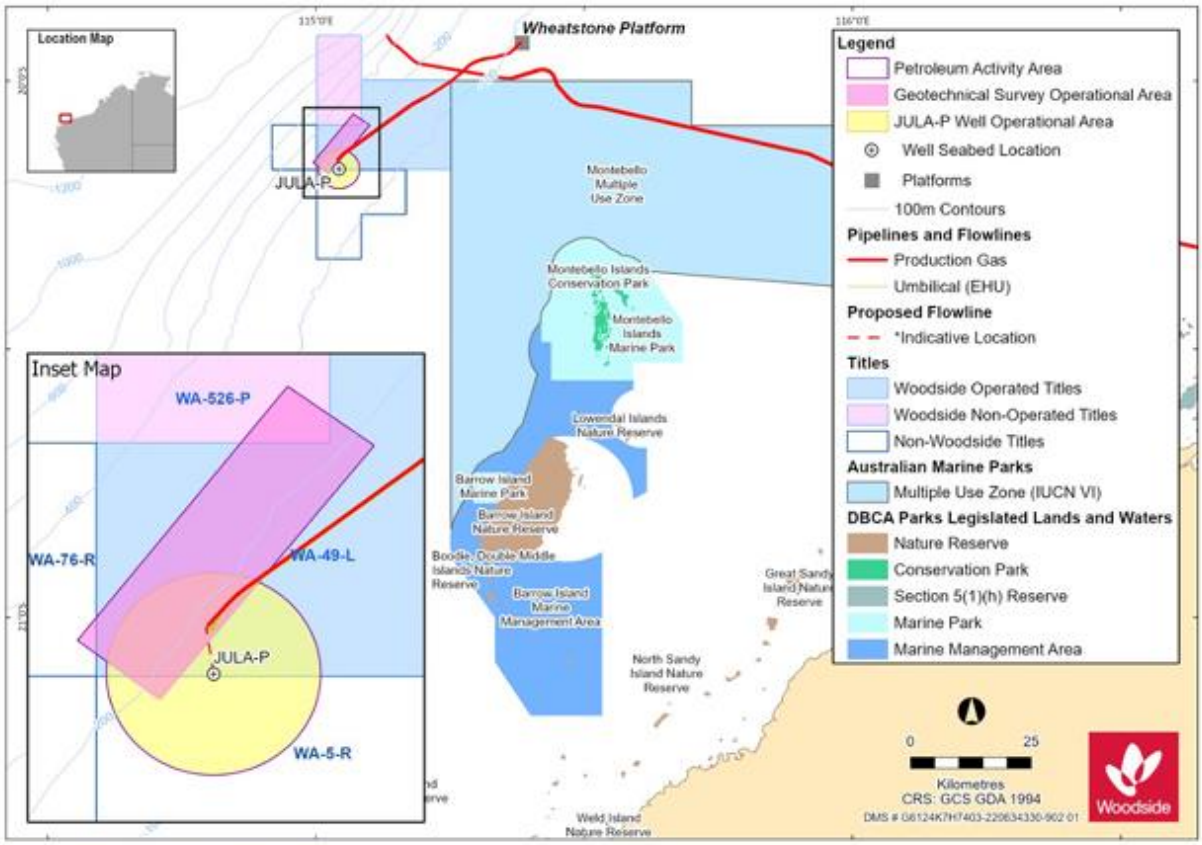


Figure 1 Petroleum Activity Program Operational Areas

Table 1. Activity summary

Julimar Appraisal Drilling and Survey Environment Plan	
Title Area	• WA-49-L
Approximate location	• 20° 09' 52.289"S | 115° 02' 35.331"E
Approximate water depth	• Operational Area - 130-240 m • Proposed JULA-P well location - 163 m
Commencement date	• Drilling is currently anticipated in Q2 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Approximate estimated duration	• Drilling, appraisal and suspension activities are currently anticipated to take approximately 60 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take approximately 14 days to complete. • Well P&A activities are currently anticipated to take approximately 20 days to complete, if required.
Vessels	• MODU • General supply / support vessels • Survey / AHT vessel
Operational Areas and Exclusion zones	• An approximate 50 km² Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements. • An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.
Distance to nearest town	• ~160 km north-west of Dampier
Distance to nearest marine park/nature reserve	• ~16 km northwest of the Montebello Marine Park – Multiple Use Zone (Cwlth) • ~42 km northwest of Montebello Islands Marine Park

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 **16 September 2022** via:

E: feedback@woodside.com.au

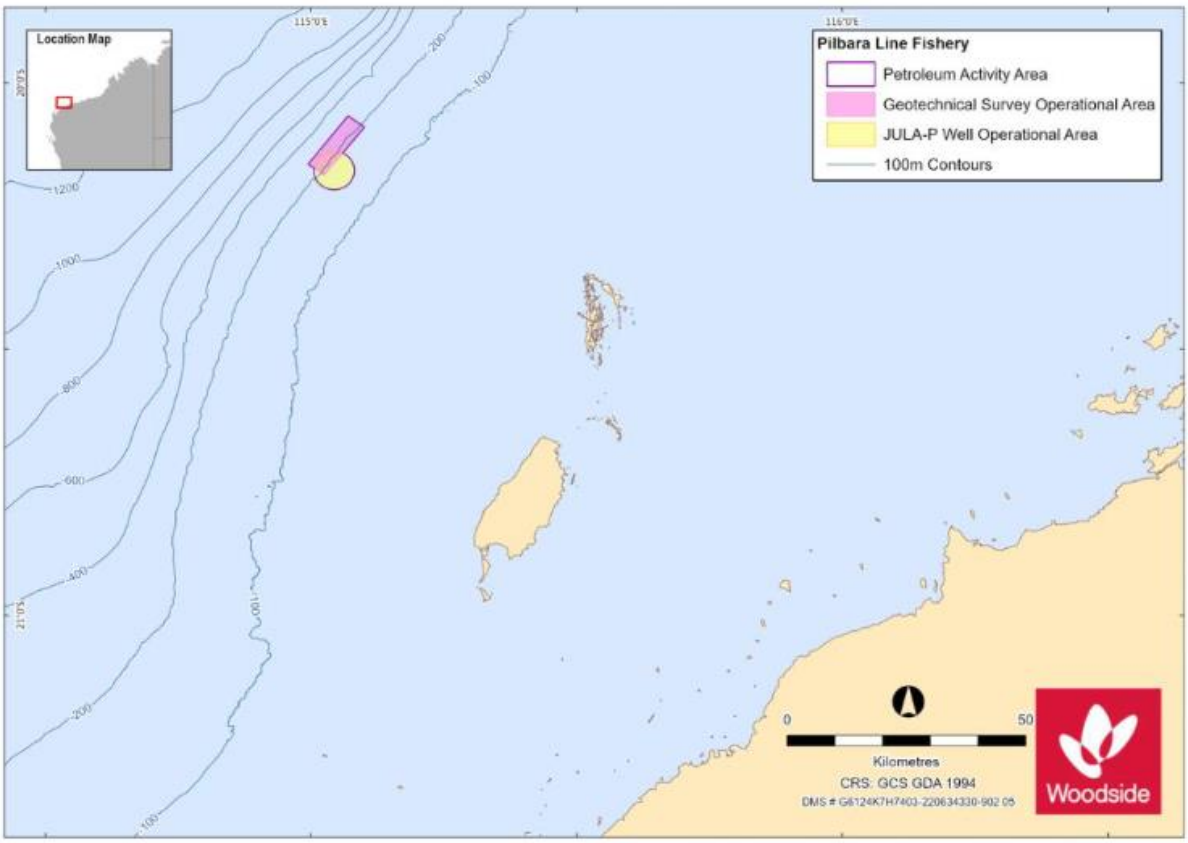
Toll free: 1800 442 977

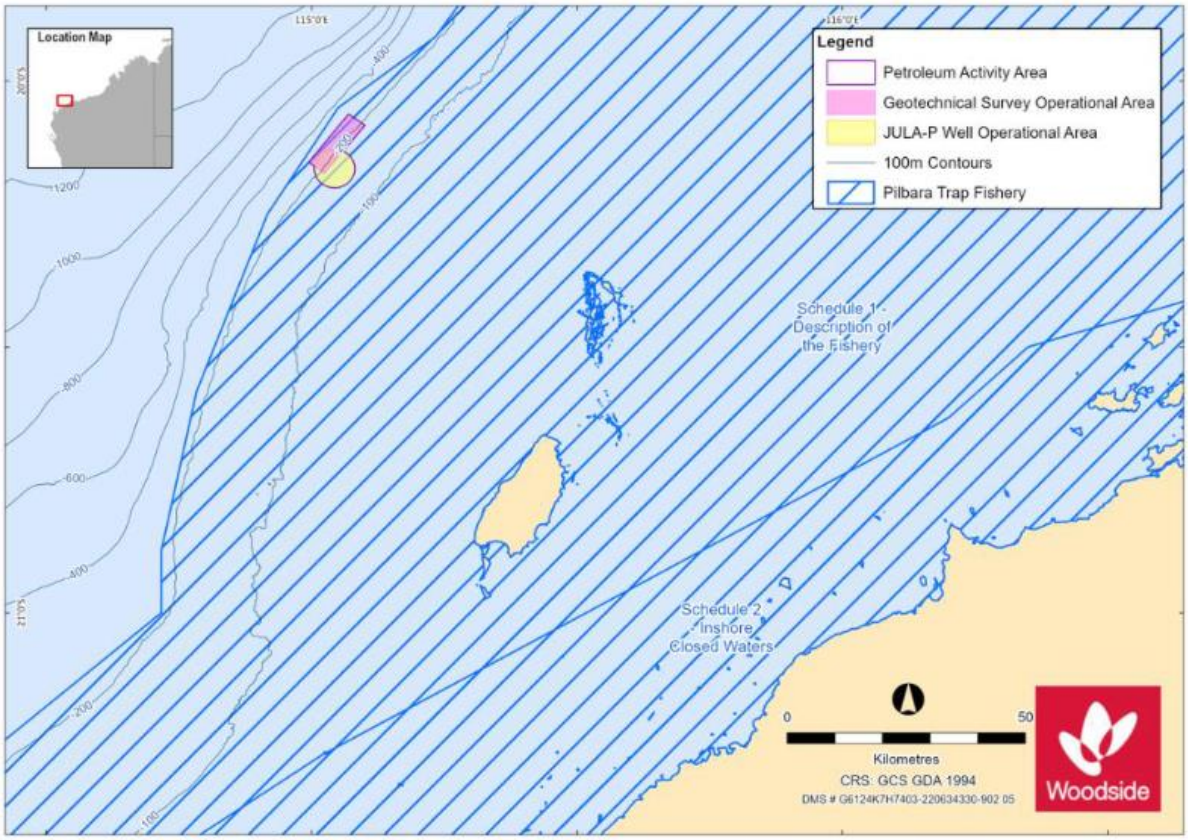
Please note that stakeholder feedback will be communicated to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) as required under legislation. Woodside will communicate any material changes to the proposed activity to affected stakeholders as they arise.

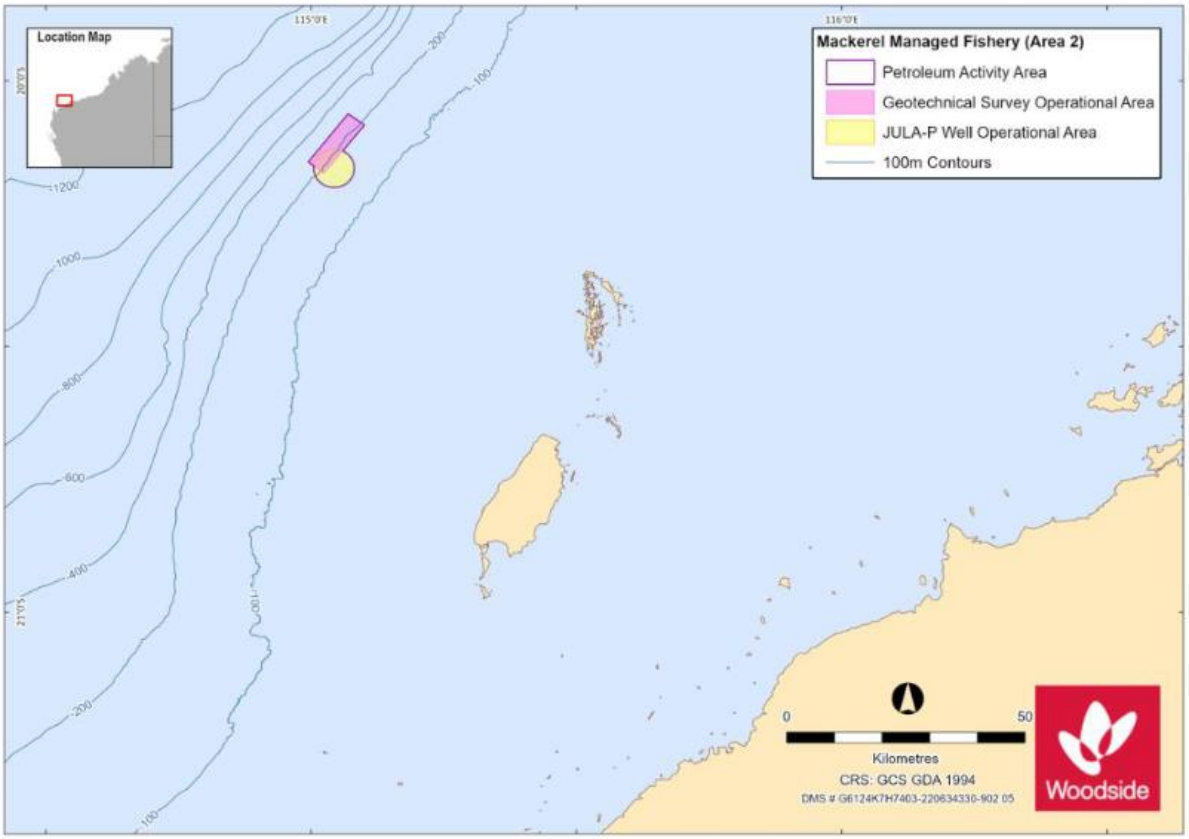
Please note that your feedback and our response will be included in our Environment Plan for the proposed activity, which will be submitted to the NOPSEMA for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth)*.

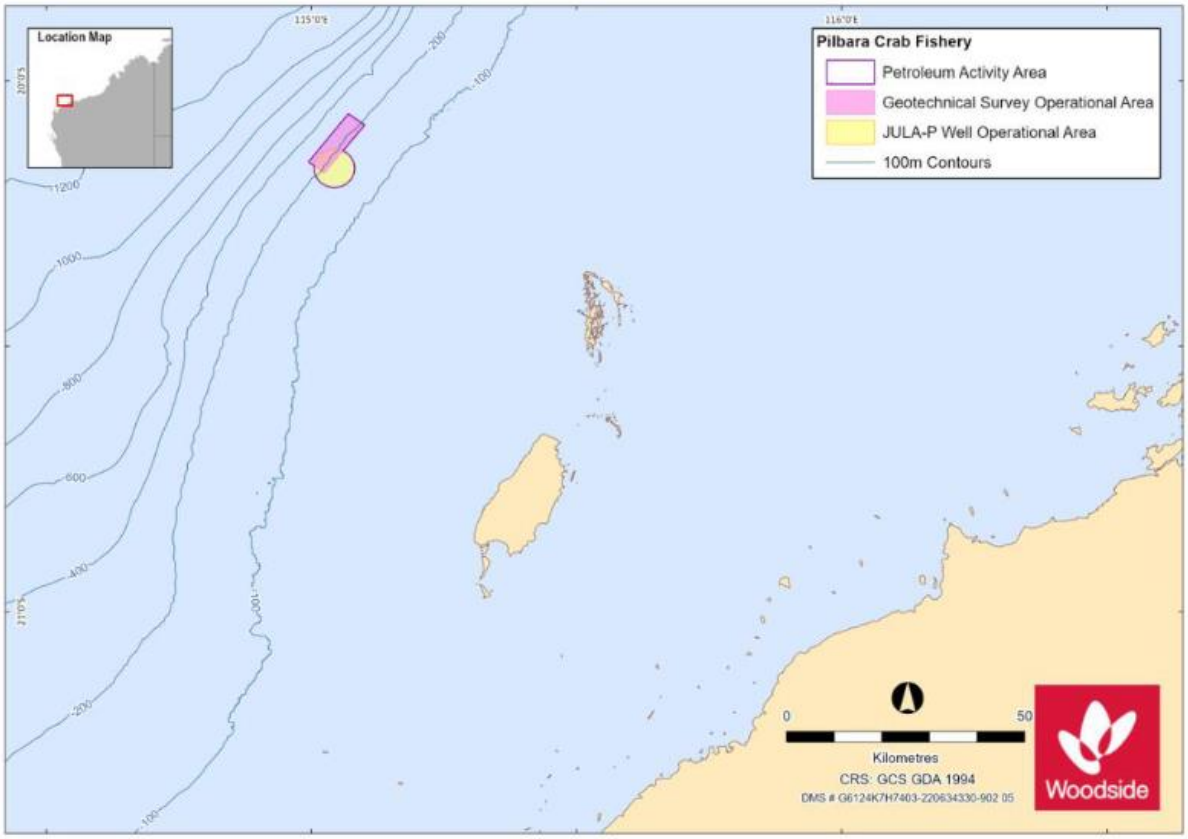
Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

1.18 Fisheries map sent to DPIRD, WAFIC, Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, Pilbara Trap Fishery and Pilbara Line Fishery (16 August 2022)

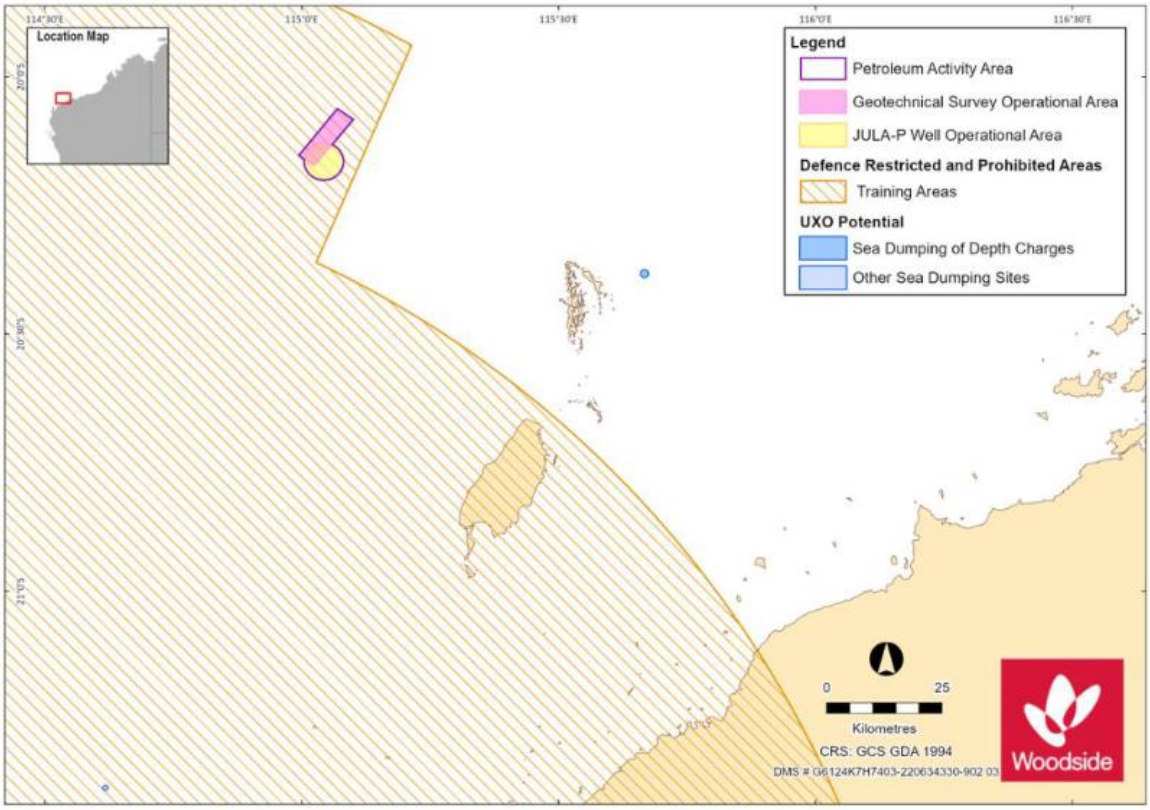




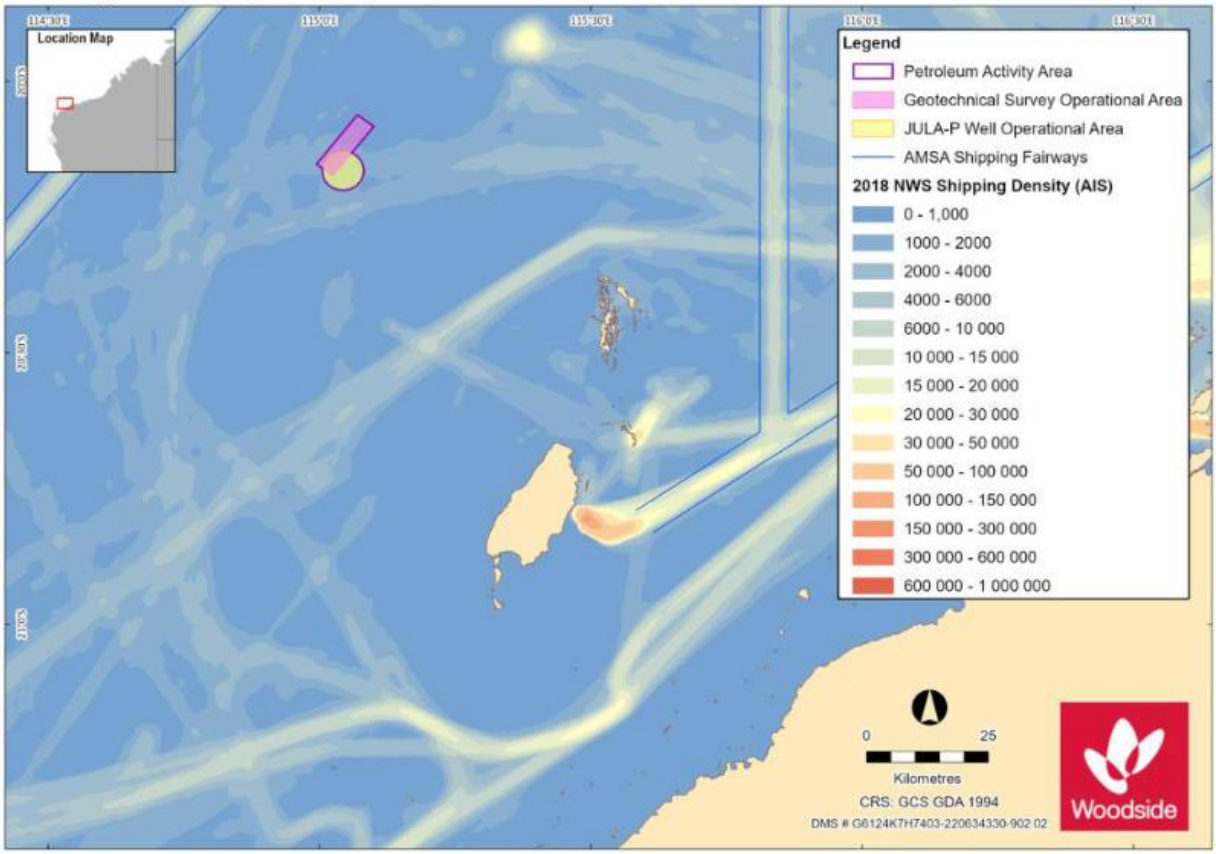

Location Map
Mackerel Managed Fishery (Area 2)
Petroleum Activity Area
Geotechnical Survey Operational Area
JULA-P Well Operational Area
100m Contours
115°0'E
116°0'E
20°0'S
21°0'S
200
100
1200
1000
800
600
400
100
200
100
0
50
Kilometres
CRS: GCS GDA 1994
DMS # G6124K7H7403-220634330-902 05
Woodside


Location Map
Pilbara Crab Fishery
Petroleum Activity Area
Geotechnical Survey Operational Area
JULA-P Well Operational Area
100m Contours
115°0'E
116°0'E
20°0'S
21°0'S
200
100
1200
1000
800
600
400
100
200
100
0
50
Kilometres
CRS: GCS GDA 1994
DMS # G6124K7H7403-220634330-902 05
Woodside

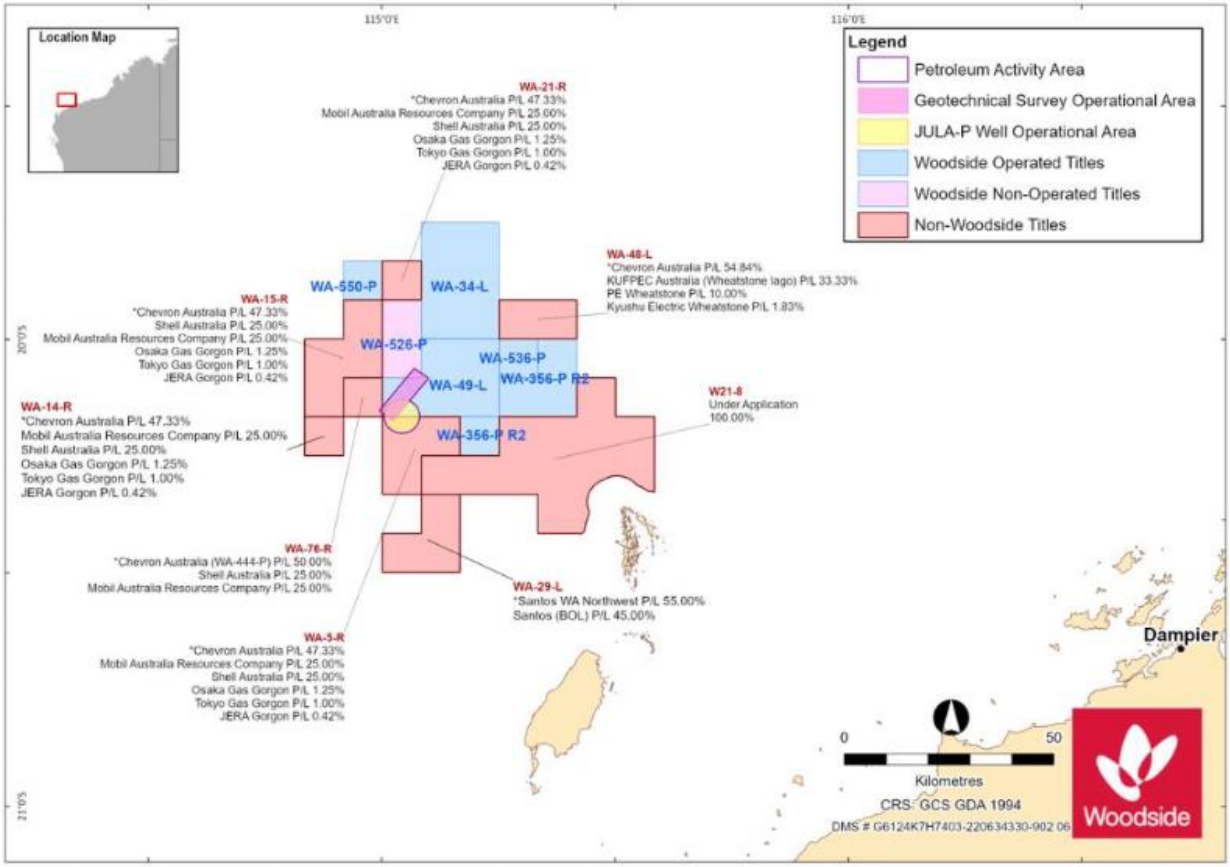
1.19 Defence zone map sent to DoD (16 August 2022)



1.20 Shipping lane map sent to AHO and AMSA – Marine Safety (16 August 2022)



1.21 Titleholder map sent to Chevron Australia, Osaka Gas Gorgon, Tokyo Gas Gorgon and JERA Gorgon, Mobil Australia Resources Company, Shell Australia, KUFPEC Australia (Wheatstone lago), PE Wheatstone, Kyushu Electric Wheatstone, Santos WA Northwest, Santos (BOL) (16 August 2022)



2. Additional Consultation

2.1 Email sent to Australian Border Force (ABF), Department of Industry, Science and Resources (DISR), Department of Mines, Industry Regulation and Safety (DMIRS), Australian Petroleum Production and Exploration Association (APPEA), Recfishwest, Marine Tourism WA, WA Game Fishing Association, Karratha Charter Boat, Tourism and Dive Operators (6 September 2022)

Dear Stakeholder

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risks and associated management measures. The Information Sheet is also available on our website.

Please provide your views by **16 September 2022**.

2.2 Email sent to Australian Fisheries Management Authority (AFMA) (6 September 2022)

Dear AFMA

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed

by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and relevant fisheries map is attached.

Please provide your views by **16 September 2022**.

2.3 Email sent to Department of Climate Change, Energy, the Environment and Water (DCCEEW) (6 September 2022)

Dear Department of Climate Change, Energy, the Environment and Water

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) is attached.

Please provide your views by **16 September 2022**.

2.4 Email sent to Department of Defence (6 September 2022)

Dear Department of Defence

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.

- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and defence zone map are attached.

Please provide your views by **16 September 2022**.

2.5 Email sent to Director of National Parks (6 September 2022)

Dear Director of National Parks

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risks and associated management measures. The Information Sheet is also available on our website.

Please provide your views by **16 September 2022**.

2.6 Email sent to Department of Primary Industries and Regional Development (DPIRD) (6 September 2022)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well

location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.

- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and relevant fisheries map is attached.

Please provide your views by **16 September 2022**.

2.7 Email sent to Pilbara Trap Fishery (6 Licence Holders) and Pilbara Line Fishery (9 Licence Holders) (6 September 2022)

Dear Fishery Stakeholder

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and relevant fisheries map is attached.

Please provide your views by **16 September 2022**.

2.8 Letter sent to Pilbara Crab Fishery (1 Licence Holder) (6 September 2022)

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

6 September 2022

Dear Fishery Stakeholder

Woodside previously consulted you (letter attached) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and relevant fisheries map is attached.

Please provide your views by **16 September 2022**.

Kind 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

Attached: Consultation letter (16 August 2022), Consultation Information Sheet, relevant fisheries map

2.9 Letter sent to Mackerel Managed Fishery (Area 2) (23 Licence Holders) (6 September 2022)

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

6 September 2022

Dear Fishery Stakeholder

Woodside previously consulted you (letter attached) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and relevant fisheries map is attached.

Please provide your views by **16 September 2022**.

Kind 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

Attached: Consultation letter (16 August 2022), Consultation Information Sheet, relevant fisheries map

2.10 Email sent to Chevron Australia, Osaka Gas Gorgon, Tokyo Gas Gorgon and JERA Gorgon (6 September 2022)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future

development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and Titleholder map is attached.

Please provide your views by **16 September 2022**.

2.11 Email sent to Exxon Mobil Australia Resources Company, Shell Australia, KUFPEC Australia (Wheatstone Iago), PE Wheatstone, Kyushu Electric Wheatstone, Santos WA Northwest, Santos (BOL) (6 September 2022)

Dear Titleholder

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) and Titleholder map is attached.

Please provide your views by **16 September 2022**.

2.12 Email sent to Commonwealth Fisheries Association (CFA), Australian Southern Bluefin Tuna Industry Association (ASBTIA), Tuna Australia and Pearl Producers Association (PPA) (6 September 2022)

Julimar Appraisal Drilling and Survey Environment Plan

Dear Stakeholder

Woodside previously consulted you (email below) on its plans to drill an appraisal well and conduct geotechnical and geophysical surveys in title area WA-49-L to inform future development decisions for the Julimar field, located approximately 160 km north-west of Dampier. Water depth at the proposed well location is approximately 163 m.

The following activities are being proposed, which will be managed under the Julimar Appraisal Drilling and Survey Environment Plan.

- One new appraisal-keeper well, JULA-P, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the JULA-P well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Drilling is currently contemplated in Q2 2023.
- Geotechnical and geophysical surveys will be conducted to support JULA-P well activities and future drilling mooring designs. Surveys are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP. Survey activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P.

An information sheet (also on our website) is attached.

Please provide your views by **16 September 2022**.

3. Activity update consultation

3.1 Woodside Activity Update Consultation Information Sheet (sent to all relevant persons

JULIMAR APPRAISAL DRILLING AND SURVEY ENVIRONMENT PLAN (EP)

CARNARVON BASIN, NORTH-WEST AUSTRALIA

Overview

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 consultation.

Drilling

Woodside is planning to drill one new appraisal-keeper well, Julimar South-1, to inform future development of the Julimar field. The activity will target the deeper sands of the Julimar field to further understand reservoir properties, which is key to future development decisions.

Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location which involves lowering an anchor to the seabed and tensioning it to determine its holding ability. This process will be repeated multiple times and the anchor will be recovered after each test. Anchor hold tests will result in a minor, highly localised, disturbance to the seabed due to the small-scale nature of the activity.

The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Development of the Julimar South-1 well is subject to future development decisions and environmental approvals. If the well is not developed, it will be plugged and abandoned (P&A) at a point during the life of this EP (three years). If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP. The activities will be undertaken in Commonwealth waters around 160 km north-west of Dampier in title area WA-49-L. The Julimar South-1 well will be located at approximately 163 m water depth.

Drilling is currently contemplated in Q3 2023, with contingent P&A activities in 2024 or 2025. However, drilling may be performed at any point within three years of EP acceptance.

Surveys

Geotechnical and geophysical surveys are also included in the scope of the proposed EP to support future drilling mooring designs.

Geotechnical and geophysical surveys will involve seafloor sampling and scanning. Information from these surveys will inform safe and effective anchoring plans in future activities by better understanding seabed sediment characteristics in the area.

Activities will occur within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be at any point during the life of the three-year EP.

Project vessels

The proposed drilling, appraisal and suspension activities for the Julimar South-1 well will be performed by a mobile offshore drilling unit (MODU). The project may be supported by general support vessels, including anchor handling vessel/s and survey vessel/s. A survey vessel or anchor handling tug (AHT) vessel will perform survey activities.

Drilling, appraisal and suspension activities are currently expected to take approximately 40 days to complete, and survey activities approximately 45 days to complete. It is anticipated that vessels will operate 24 hours per day for the duration of the activities.

In the event that well P&A is required, the activity will be performed using a MODU and is expected to take approximately 21 days to complete.

Communications with mariners

An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the Julimar South-1 well.

A 500 m safety exclusion zone will apply around the MODU 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 zone. The Julimar South-1 well will be marked on navigational charts.

Background

Woodside Energy Julimar Pty Ltd (Woodside), is operator of the Julimar Field Production System in Title Areas WA-49-L, WA-26-PL and WA-29-PL. The system consists of subsea wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals.

The system produces gas and condensate from the Brunello and Julimar fields to the offshore Chevron-Operated Wheatstone platform. Gas and condensate from the Wheatstone Platform is then transported to the onshore Chevron-operated Wheatstone LNG facility for processing, storage and supply of LNG and condensate to customers. The system normally operates 24 hours per day, 365 days per year.

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, the intent is to minimise environmental and social impacts associated with the proposed activities, and we are seeking feedback or comments you may have to inform our decision making.

Joint Venture

Woodside is operator of on behalf of the Julimar joint venture participants. The participants are Woodside and KUFPEC Australia (Julimar) Pty Ltd.

We welcome your feedback by 17 March 2023

*Please note: the well was previously referred to as JULA-P, it is now known as Julimar South-1.

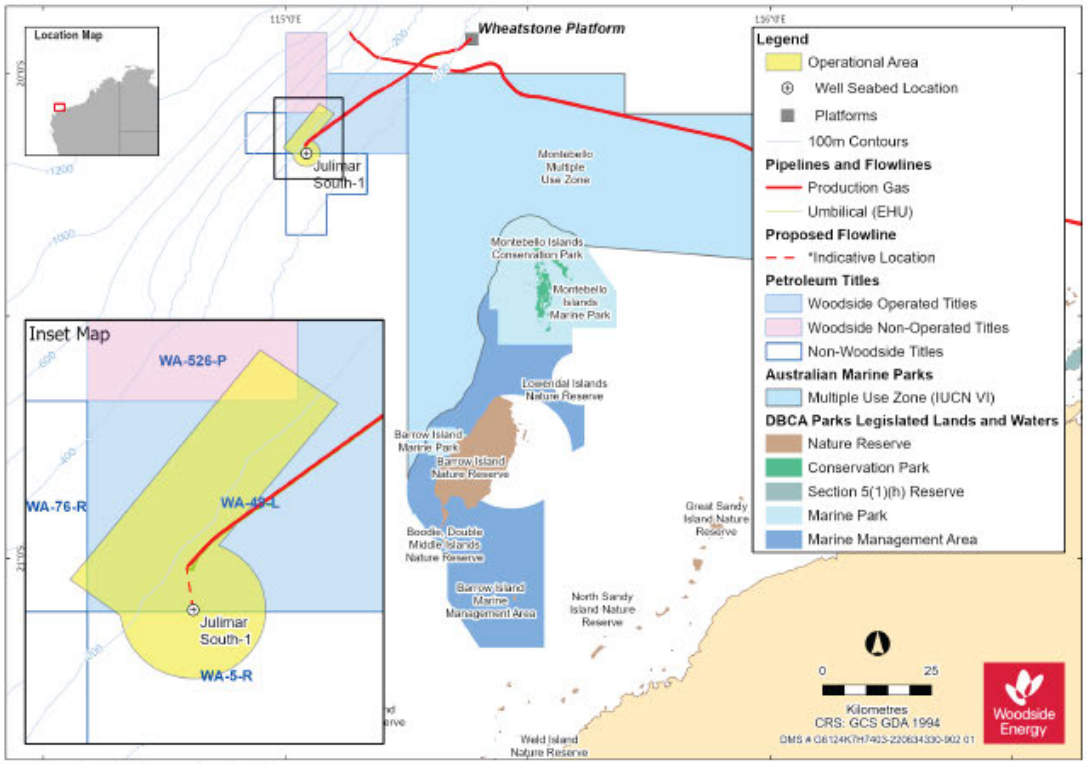


Figure 1. Petroleum Activity Program Operational Areas

Table 1. Activity summary

Julimar Appraisal Drilling and Survey Environment Plan	
Title Area	• WA-49-L
Approximate location	• 20° 09' 52.289"S | 115° 02' 35.331"E
Approximate water depth	• Operational Area ~ 130-240 m • Proposed Julimar South-1 well location ~ 163 m
Commencement date	• Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. • Well P&A is currently anticipated in 2024 or 2025, if required. • Geophysical and geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).
Approximate estimated duration	• Drilling, appraisal and suspension activities are currently anticipated to take ~40 days to complete. • Geophysical and geotechnical survey activities are currently anticipated to take ~45 days to complete. • Well P&A activities are currently anticipated to take ~21 days to complete, if required.
Vessels	• MODU • General supply / support vessels • Survey / AHT vessel
Operational Areas and exclusion zones	• ~50 km² Operational Area will apply during geophysical and geotechnical survey activities. • A 4 km radius Operational Area will apply around the Julimar South-1 well whilst the MODU is on location. • A 500 m safety exclusion zone will apply around the MODU to manage vessel movements. • An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.
Distance to nearest town	• ~160 km north-west of Dampier
Distance to nearest marine park/nature reserve	• ~16 km north-west of the Montebello Marine Park – Multiple Use Zone (Cwlth) • ~42 km north-west of Montebello Islands Marine Park

Environment That May Be Affected (EMBA)

The environment that may be affected (EMBA) is the largest spatial extent where the Julimar appraisal drilling and survey 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 marine diesel release. Rather, the EMBA represents the merged area of many possible paths a highly unlikely 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.

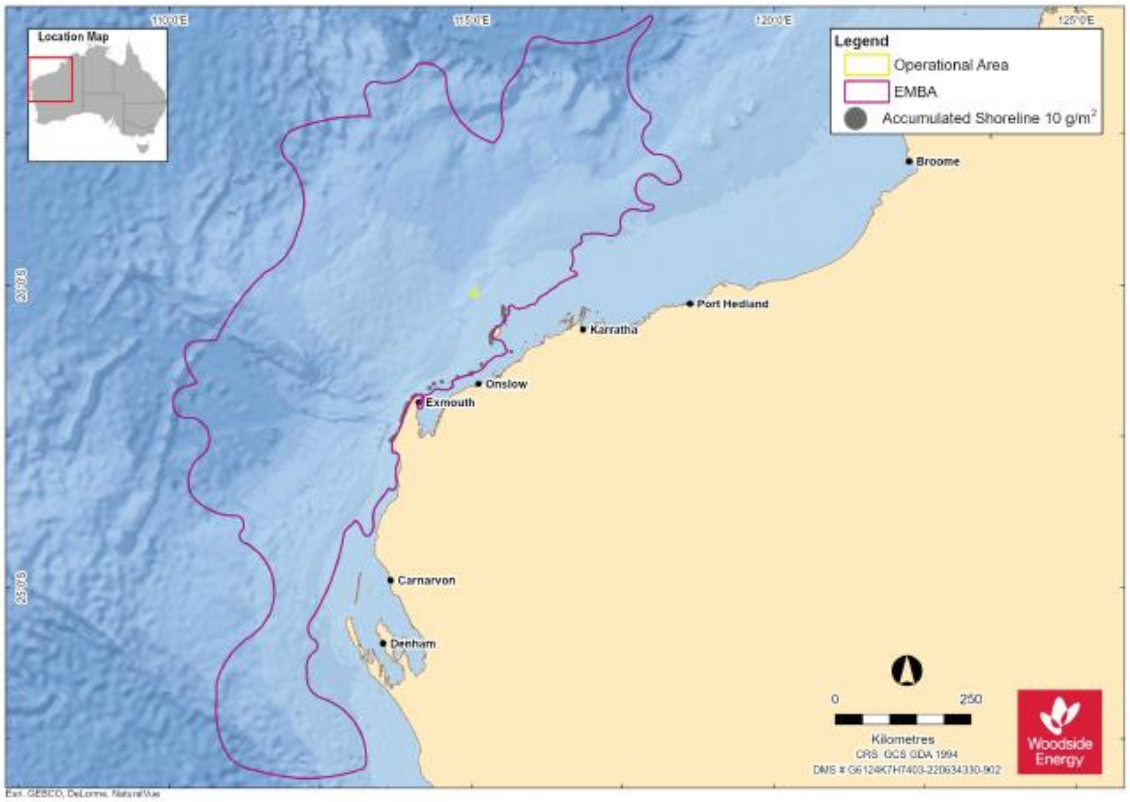


Figure 2. Environment that May Be Affected by the Julimar Appraisal Drilling and Survey Activities

Mitigation and Management Measures

Woodside has undertaken an assessment to identify potential impacts and risks to the environment arising from Julimar Appraisal Drilling and Survey Activities.

A number of mitigation and management measures for the Julimar appraisal drilling and survey activities are outlined in **Table 2**. Further details will be provided in the EP.

Table 2. Summary of key risks and/or impacts and preliminary management measures for the Julimar appraisal drilling and survey activities

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Planned			
Physical presence and interactions with other marine users	• Several vessel types will be required to complete the activity, including a Mobile Offshore Drilling Unit (MODU), survey vessel, decommissioning vessel, refuelling vessel, general support vessels and anchor handling vessels (AHVs). • The physical presence and movement of project vessels within the Operational Area has the potential to interfere with or displace other marine users. • Continued temporary presence of Julimar South-1 well infrastructure has the potential to interfere with commercial fishing.	• Other vessels in the Operational Area, which may include commercial fishing, commercial shipping and defence may experience temporary and localised displacement during the activity. • Potential impacts to commercial fisheries is expected to be limited to temporary displacement with no lasting effect, as the 500 m exclusion zone is a relatively small area and is only for the duration of the activity. • The Operational Area is considered too far offshore for recreational fishing or tourism activities to occur. Therefore it is expected that there will be no impact. • The Operational Areas do not overlap any shipping fairways and as such impacts to shipping are unlikely.	• Vessels adhere to the regulatory requirements for navigational safety. • Establish a 500 m petroleum safety zone around MODU (and decommissioning vessel if required) which is communicated to marine users. • Notify relevant government departments, fishing industry representative bodies and licence holders of activities prior to commencement and on completion of activities. • Notify the Australian Hydrographic Service (AHS) prior to commencement of the activity to enable them to update maritime charts ensuring marine users are aware of the activity. • Notify Department of Defence of activities no less than five weeks before the scheduled activity commencement date. • Consult with relevant persons so they are informed of the proposed activities.
Routine acoustic emissions: MODU and project vessels	• Project vessels may generate noise both in the air and underwater due to the operation of thrusters, engines, propellers, and on-board machinery etc. • Vessels, including the AHV, general support vessels, MOU/WIV (if required) and survey vessels, will use Dynamic Positioning (DP) where propellers and thrusters are used to hold position.	• Elevated underwater noise may affect marine fauna, including marine mammals (cetaceans), turtles and fish in three main ways: 1. By causing direct physical effects, including injury or hearing impairment. Hearing impairment may be temporary or permanent. 2. Through disturbance leading to behavioural changes or displacement from important areas. The occurrence and intensity of disturbance is highly variable and depends on a range of factors relating to the animal and situation. 3. By masking or interfering with other biologically important sounds (including vocal communication, echolocation, signals and sounds produced by predators or prey). • It is not considered credible that permanent and temporary thresholds would be exceeded for pygmy blue whales transiting through the Operational Area during migration seasons. • Marine turtles within the Operational Area are expected to be transient and behavioural impacts are expected to be short term and localised. It is not credible that permanent and temporary thresholds would be exceeded for marine turtles. • Potential impacts from acoustic emissions on fish, sharks and rays are likely to be restricted to localised and temporary avoidance behaviour.	• Comply with regulatory requirements for interactions with marine fauna to prevent adverse interactions.

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Routine acoustic emissions: geophysical and geotechnical surveys	• The geophysical survey instruments that may be used include, but are not limited to, sub-bottom profiler (SBP, either chirp boomer or sparker), multibeam echo sounder (MBES), side-scan sonar (SSS) and Ultra Short Baseline (USBL) positioning system. These instruments will generate underwater noise. • The key geotechnical survey sound sources include the penetration tests and sampling boreholes undertaken at the seabed.	• Elevated underwater noise may affect marine fauna, including marine mammals (cetaceans), turtles and fish in three main ways (see above). • The sound generated by the various geophysical and geotechnical survey instruments may result in localised and temporary behavioural changes to marine fauna within tens or hundreds of metres. The extent of such effects is not expected to be materially greater than the area where disturbance may occur as a result of vessel noise. • The behavioural effects are not expected to have a lasting impact on protected species, ecosystems, and functions.	• Woodside has assessed a range of controls and no reasonable additional/alternative controls were identified that would further reduce the potential impacts without grossly disproportionate sacrifice, therefore Woodside considers that this potential impact ALARP under standard operations.
Physical presence – disturbance to benthic habitat from MODU anchoring, drilling operations, geotechnical and geophysical surveys, subsea installation and ROV operations	Seabed disturbance may result from the following: 1. Drilling operations (from installation of the blow out preventer (BOP) and conductor), 2. Mooring installation (if a moored MODU is used), including anchor hold testing for future drilling campaigns, 3. Geotechnical surveys, including penetration testing and coring, 4. Remotely Operated Vehicle (ROV) operations and other activities in proximity to the seabed such as marine growth removal from infrastructure, and 5. Wellhead cutting and removal.	• Habitat modification as a result of seabed disturbance could occur within a localised radius of the well and geotechnical sampling sites. Near this area, it is possible that benthic communities may be reduced or altered, leading to a highly localised impact to epifauna and infauna benthic communities present. • The Continental Slope Demersal Fish Communities Key Ecological Feature (KEF) overlaps the Operational Areas. Potential seabed disturbances in this area are expected to be highly localised and short-term.	• Remove well infrastructure above the mudline within three years of not being used. • Mooring systems (chains/wires and anchors) will be removed. • Infrastructure will be placed on the seabed within the predefined design footprint using positioning technology to limit seabed disturbance. • MODU well site locations consider seabed sensitivities. • Geotechnical survey activities will not be undertaken outside of the Operational Area.

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Atmospheric emissions and greenhouse gas (GHG) emissions	• Atmospheric emissions and GHGs will be generated by the MODU, project vessels and helicopters from internal combustion engines and incineration activities. • Emissions may arise from venting GHGs in the unplanned event of a 'well kick'. This venting process ensures well integrity is maintained and emergency conditions are avoided.	• Emissions from MODU, project vessels, helicopters and well kick venting could result in temporary, localised reductions in air quality in the immediate vicinity. • Given the offshore location of the Operational Area, and the low volumes of atmospheric emission which will be generated, biodiversity, ecological integrity, social amenities, and human health will not be impacted and any potential impact to air quality is slight. • Given the nature and scale of GHG emissions from vessel and MODU fuel usage for this activity, the potential GHG impact and risk from this activity is considered negligible.	• Comply with regulatory requirements for marine air pollution and GHG emissions reporting. • Manage vessel speed to reduce fuel combustion where practicable. • Well drilled in compliance with the accepted Well Operations Management Plan (WOMP), including implementation of barriers to prevent a loss of well integrity. • Mitigation measures to reduced gas venting volumes in the event of a well kick e.g. installation of a BOP.
Routine and non-routine discharges – MODU and project vessels	• Sewage, greywater, and putrescible waste will be discharged from MODU and project vessels. • Bilge water, deck drainage and brine and cooling water may also be discharged.	• The main impact associated with ocean disposal of sewage and other organic wastes (i.e. putrescible waste) is eutrophication. Eutrophication occurs when the addition of nutrients, such as nitrates and phosphates, causes adverse changes to the ecosystem including short-term, localised impacts to water quality. • No significant impacts are expected to water quality from planned discharges because of the minor quantities involved, the expected localised mixing zone and high level of dilution into the open water marine environment of the Operational Area. • Similarly, although some marine fauna may transit the Operational Area, it is anticipated that any potential for impact remains low due to the localised nature of discharges and rapid dilution.	• Comply with regulatory requirements for marine discharges. • Chemicals will be selected with the lowest practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process.

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Routine and non-routine discharges - drill cuttings, drilling fluids and well removal fluids	Drill operations may result in the following discharges: • Routine discharge of Water Based Mud (WBM) and/or treated Non-Water Based Mud (NWBM) and drill cuttings to the seabed and marine environment will occur. • Discharges of other fluids may occur as required such as wash water from mud pits, vessel tank wash fluids and well clean-out fluids. Permanent plugging program and removal of well infrastructure may result in the following discharges: • Small volumes of cement, water-based drilling fluids, residual hydrocarbons and produced formation water, • Metal swarf, drilled cement and formation rock, if milling is required, and • Small amounts of flocculant and grit will be released below or at the mudline. Geotechnical surveys may result in the following discharges: • Drill cuttings and fluids (as above) will be discharged at the borehole location for geotechnical surveys. These discharges will be of a lower magnitude than well drilling.	• Drill cuttings and retained drilling fluid discharges are expected to increase turbidity and total suspended sediment levels above ambient concentrations above the seabed (for top-hole well sections) or in the upper surface layers (for bottom-hole well sections). This reduction in water quality is expected to be temporary (limited to the operational discharges during drilling) and subject to rapid dispersion and dilution by prevailing seabed currents. • Cutting of the wellhead may result in localised smothering of benthic communities and cause localised and temporary increases in turbidity around the well. • It is expected that potential impacts to plankton species will be highly localised, within tens of meters, and return to previous conditions within a relatively short period of time. This is due to the open nature of the marine environment and associated environmental conditions, the content and dispersive nature of drilling muds within the marine environment and the high population replenishment of these organisms. • Potential impacts to benthic communities are expected to be largely limited to an area surrounding the well location. The low sensitivity of the benthic communities/ habitats within and in the vicinity of the Operational Area, 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 mean predicted impact is considered to be slight. • Potential impacts to the Exmouth Plateau KEF, which overlaps the Operational Area, relate to ecological impacts to the seabed habitat and benthic communities. The extremely small portion of the overall KEF area predicted to be impacted in combination with the predicted recovery of the affected benthic communities mean that predicted impact is considered to be minor. • As only a small portion of the overall KEF area overlaps the well Operational Area and in combination with the predicted recovery of the affected benthic communities, any potential impact is considered to have no lasting effect.	• All 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. • NWBMs only 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 fluids will be returned to shore. • Drill cuttings returned to the MODU will be discharged below the water line to facilitate dispersion.

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Routine and non-routine discharges: cement, cementing fluids, subsea well fluids, produced water and unused bulk product	• Routine discharge of cement and cementing fluids to the seabed and marine environment. • Routine discharge of subsea well fluids, completion fluids, produced water and well intervention/ workover fluids. • Non-routine discharge of unused bulk product.	• Cement operations 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. • The highly localised physical footprint of cement on the seabed at the well site is not expected to affect the overall diversity or ecosystem function of the benthic communities of the area. • Given the minor quantities of routine and non-routine planned discharges (including subsea control fluids, well displacement fluids), short discharge durations and the low toxicity and high dispersion in the open, offshore environment, any potential impacts on the marine environment are expected to be localised.	• 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 specification is not met during well unloading and completion activities, if produced water is not flared, it will be processed through the well test water filtration treatment package prior to discharge to the environment. • No bulk cement, bentonite or barite discharged without a documented environmental assessment.
Light emissions	• Project vessels will use external lighting to navigate and conduct safe operations at night. • Vessel lighting will also be used to communicate the vessel's presence to other marine users (i.e. navigation/ warning lights). • Once the activities are completed, no permanent ongoing project lighting will occur in these locations.	• Light emissions may affect fauna (such as marine turtles and birds) in two main ways: 1. Behaviour: artificial lighting has the potential to create a constant level of light at night that can override natural levels and cycles. 2. Orientation: If an artificial light source is brighter than a natural source, the artificial light may override natural cues, leading to disorientation. • Project vessel light emissions to marine turtles are unlikely to result in more than localised behavioural disturbance to individuals transiting the Operational Area, with no lasting effect to the species. • The Operational Area may be occasionally visited by seabirds and overlaps the Wedgetail Shearwater Foraging Biologically Important Area. Potential impacts are expected to be limited to localised behavioural disturbance to isolated individuals, with no significant impact to seabird foraging.	• Lighting will be limited to the minimum required for navigation and safe operational requirements, with the exception of emergency events. • Implement the Woodside Seabird Management Plan.

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Unplanned			
Unplanned hydrocarbon release – loss of well control	• Accidental loss of hydrocarbons to the marine environment due to loss of well control may occur, caused by failure of well barriers.	• A loss of well containment and resulting blowout event is considered to be a highly unlikely event as it has occurred only very infrequently in the industry, and never in the Company's history. • Modelling of a loss of well containment was undertaken with the outcome, EMBA , illustrated in **Figure 2**. • JULA 04 condensate, used as a representative analogue for Julimar South-1, is a relatively volatile and non-persistent natured hydrocarbon. Up to about 43% of the condensate can evaporate within the first 12 hours and a further 22% could evaporate within the first 24 hours. • Potential impacts across the whole EMBA were assessed as including receptors such as plankton, fish, turtles, sea snakes, marine mammals, seabirds and migratory shorebirds, tourism, recreation, commercial fisheries, and cultural heritage (for example). • Considering receptor sensitivity, this unplanned event has the potential to result in a "Major" consequence or less.	**Preventing loss of well control** • Wells to be 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** • Develop a project specific Oil Pollution Emergency Preparation document (OPEP) including first strike response plan. • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned. • Emergency response activities would be implemented in line with the OPEP.

Unplanned hydrocarbon release – vessel collision	• Project vessels will use marine diesel fuel, meaning a vessel collision involving a project vessel or third-party during the activity may potentially result in the release of marine diesel.
	• For a collision to result in the worst-case scenario diesel release, several factors must occur as follows:
	  • Identified causes of vessel interaction must result in a collision,
	  • The collision has enough force to penetrate the vessel hull and 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.
		• In the highly unlikely event of a vessel collision causing a release of hydrocarbons, impacts to water quality and marine ecosystems could occur.
		• Modelling of a surface release of marine diesel within ~2 km from the Operational Areas was used to understand potential impacts.
		• Marine diesel is a relatively volatile, non-persistent nature hydrocarbon with up to 41% evaporating within the first 24 hours.
		• Potential impacts across the whole EMBA were assessed including receptors such as plankton, fish, marine turtles, marine mammals, seabirds and migratory shorebirds, tourism, recreation, and commercial fisheries (for example).
		• Taking into account receptor sensitivity, the receptors were rated as having a potential consequence level of 'Minor' or less.
			Preventing vessel collision
			• Comply with regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements.
			• Consult with relevant persons so that other marine users are informed and aware, reducing the likelihood of a collision.
			• Establish temporary exclusion zones around vessels which are communicated to marine users to reduce the likelihood of collision.
			• Maintain a support vessel on standby as required during the activity to assist in third-party vessel interactions to reduce the likelihood of a collision.
			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 Impact/Risk	Preliminary Mitigation and/or Management Measures
Unplanned hydrocarbon release - bunkering	• Accidental loss of hydrocarbons to the marine environment during bunkering/ refuelling may occur caused by partial or total failure of a bulk transfer hose or fittings due to operational stress or other integrity issues.	• Any unplanned marine diesel surface release expected to be confined to within several kilometers of the release site, and well within the EMBA identified for the vessel collision scenario. • This unplanned marine diesel release may have the potential to result in changes in water quality and fauna behaviour. • Receptors considered in the risk assessment for this unplanned event included marine mammals, marine reptiles, fish, sharks, and rays. • Taking into account receptor sensitivity, the receptors were rated as having a potential consequence level of 'Minor' or less.	**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.
Unplanned discharge –deck and subsea spills	• Accidental discharge of drilling 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. • Accidental discharge of hydrocarbons/ chemicals from MODU and project vessels deck activities and equipment, from subsea ROV hydraulic leaks. • Subsea release of hydraulic fluid from geotechnical and geophysical equipment.	**Drilling fluids and cements** • Unplanned discharges of drilling fluids have a worst-case credible spill scenario of up to 8 m^3. • Unplanned discharge of cement would typically be <100 L. • These discharges would be to the sea surface and should rapidly dilute through mixing by surface currents and wave action. Any unplanned release of NWBM or WBM should be confined to open waters and would not be expected to reach any sensitive receptors. • Given the small volumes, and the offshore location of the Operational Area, any impact of change to water quality resulting from unplanned discharge of drilling fluids is expected to be negligible and temporary. **Chemicals/hydrocarbons from MODU or project vessels** • Unplanned discharges of non-process chemicals and hydrocarbons may decrease the water quality in the immediate vicinity of the release. Only small volmes (<100 L) would be expected to occur in an unplanned release event, resulting in very short-term impacts to water quality, and limited to the immediate release location. • No significant impacts from the accidental discharges described would be anticipated due to the offshore/ open water locations, low sensitivity of surrounding water quality and high level of dilution into the open water marine environment of the Operational Area. **Subsea release from geotechnical and geophysical equipment** • Survey vessels will place equipment on the seabed during the surveys which may contain relatively small volumes (about 5-10 L) of hydraulic fluids, which in an unplanned event may be released.	• Chemicals will be selected with the lowest practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process. • No overboard disposal of bulk NWBM. • 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).

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Unplanned discharge of solid hazardous/non-hazardous solid waste/equipment	• Accidental, unplanned loss of hazardous or non-hazardous solid wastes/equipment to the marine environment may occur if dropped or blown overboard.	• The potential impacts of hazardous or non-hazardous solid wastes and 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. • The temporary or permanent loss of waste materials/ equipment into the marine environment is not likely to have a significant environmental impact, based on the location of the Operational Area, the types, size and frequency of wastes that could occur, and species present.	• Comply with regulatory requirements for the prevention of marine pollution and handling of hazardous wastes. • Implement a Waste Management Plan. • Solid waste/equipment dropped to the marine environment will be recovered where safe and practicable to do so. • Where retrieval is not 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.
Physical presence: dropped objects and anchor drag	• There is the potential for objects to be dropped overboard from the MODU or project vessels. • High energy weather events such as cyclones, occurring while the MODU or AHV is on station, can lead to excessive loads on the mooring lines, resulting in failure (either anchor(s) dragging or mooring lines parting).	• In the unlikely event of an object being dropped or mooring failure, potential environmental effects should be limited to minor physical damage to seabed and benthic communities.	• 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 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. • Specifications and requirements for mooring systems enforced which require the system to have sufficient capability that a failure of single components will not cause progressive failure of the remaining anchoring arrangement. • Tracking of the MODU will be possible when the MODU is unmanned to ensure the MODU location is tracked at all times. • Project-specific Mooring Design Analysis and mooring system testing undertaken to reduce the likelihood of mooring failure or anchor drag.
Unplanned interaction with marine fauna	• Accidental collision between project vessels and protected marine fauna. • The factors that contribute to 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 animal potentially present and their behaviours.	• Vessel movements have the potential to result in accidental collisions between the vessel (hull and propellers) and marine fauna. • The risk of vessel collision with marine mammals is present year-round but is seasonally elevated for species such as pygmy blue whales during migration periods and within migration BIAs. Given the short duration of activities within the Operational Area, and the slow speeds at which project vessels operate collisions with cetaceans are considered highly unlikely. • It is expected that marine turtles will respond to vessel presence by avoiding the immediate vicinity of the vessels, and combined with low vessel speed, this will reduce the likelihood of a vessel-turtle collision.	• Comply with regulatory requirements for interactions with marine fauna to reduce the likelihood of a collision occurring.

Potential Impact/Risk	Description of Source of Potential Impact/Risk	Description of Potential Impact/Risk	Preliminary Mitigation and/or Management Measures
Accidental introduction of invasive marine species (IMS)	• Vessels transiting to the Operational Area may be subject to marine fouling whereby organisms attach to the vessel hull. • Organisms may also be drawn into ballast tanks during onboarding of ballast water. • Submersible equipment may be subject to marine fouling.	• The deep offshore open waters of the Operational Areas, away from shorelines and/or critical habitat, more than 40 km from a shoreline and in waters more than 80 m deep, are not conducive to the settlement and establishment of IMS.	• 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

If you would like to comment on the proposed activities outlined in this information sheet, or would like additional information, please contact Woodside before **17 March 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 EP for the proposed activity, which will be submitted to 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 EP in order for this information to remain confidential to NOPSEMA.

3.2 Woodside bespoke Consultation Information Sheet (sent to all relevant person Traditional Custodians)

Woodside Energy

STAKEHOLDER CONSULTATION

INFORMATION SHEET

February 2023

JULIMAR APPRAISAL DRILLING AND SURVEY SUMMARY INFORMATION SHEET

This is a summary of the activity in plain English. More detailed information is included in the Julimar Appraisal Drilling and Survey Environment Plan (EP) Information Sheet.

Overview

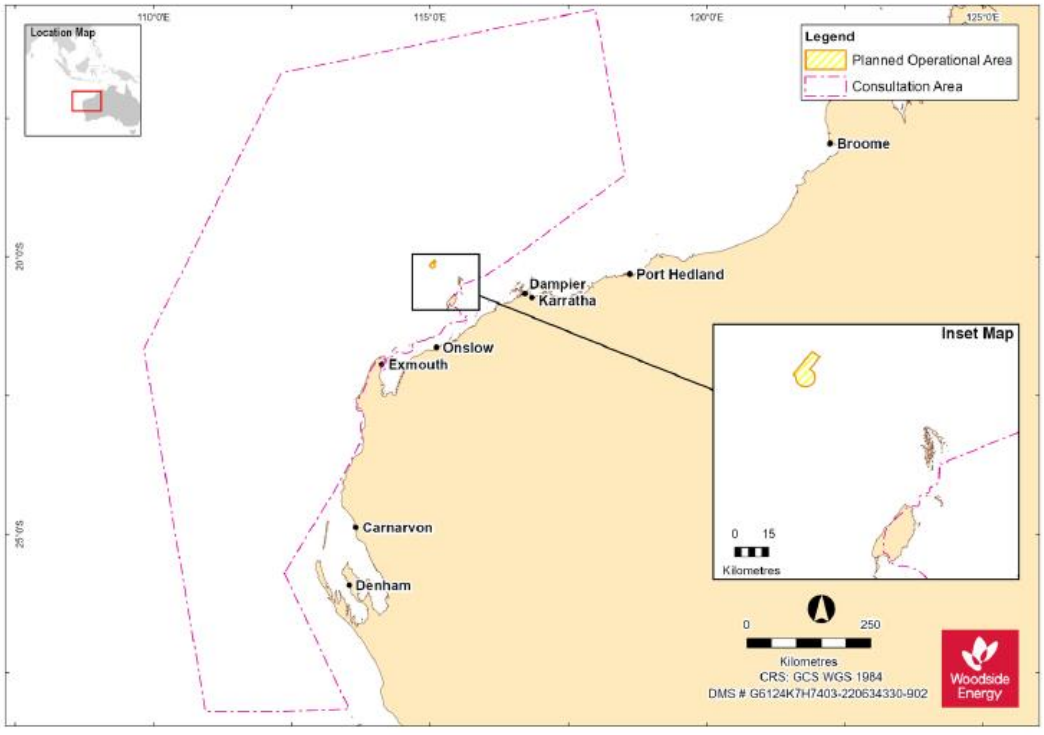
Woodside plans to drill one new appraisal well, called Julimar South-1, and possibly conducting surveys to get a better understanding of the Julimar gas field. An appraisal well is used to get more information about the properties of gas fields that have already been discovered. The activity will be divided into the following parts:

1. Drilling – involves drilling the appraisal well, carrying out an assessment of the gas field and then closing the well afterwards by cementing it. The well won't be used for production of gas.
2. Surveys – involves studying what the seafloor looks like, to plan for future activities.

The activity will be carried out using a drilling rig, support and survey vessels. This work will take place in Commonwealth waters, approximately 160 km north-west of Dampier in title area WA-49-L and at a water depth of approximately 163 m.

Woodside is planning to start the Julimar Appraisal Drilling and Survey work upon acceptance of the EP. The aim is to start the drilling work in the second half of 2023, and any potential survey work in around 2024. The activities are expected to take up to around 95 days to complete.

A map showing the location of this work is below.



Work Method

Drilling – A drill rig will be taken to the location. Anchors will be lowered in multiple locations to secure the drill rig. The appraisal well will then be drilled from the drill rig and the Julimar gas field will be studied. After the study is completed, the section of the well with gas will be cemented to prevent any potential leaks. The anchors will be removed from the seabed and the drill rig will move away. The drill rig will be attended by smaller support vessels.

Surveys – These activities will involve the use of survey vessels to study the properties of the seafloor by collecting samples and scanning. The information will be used to plan future activities.

Environmental Impacts and Management

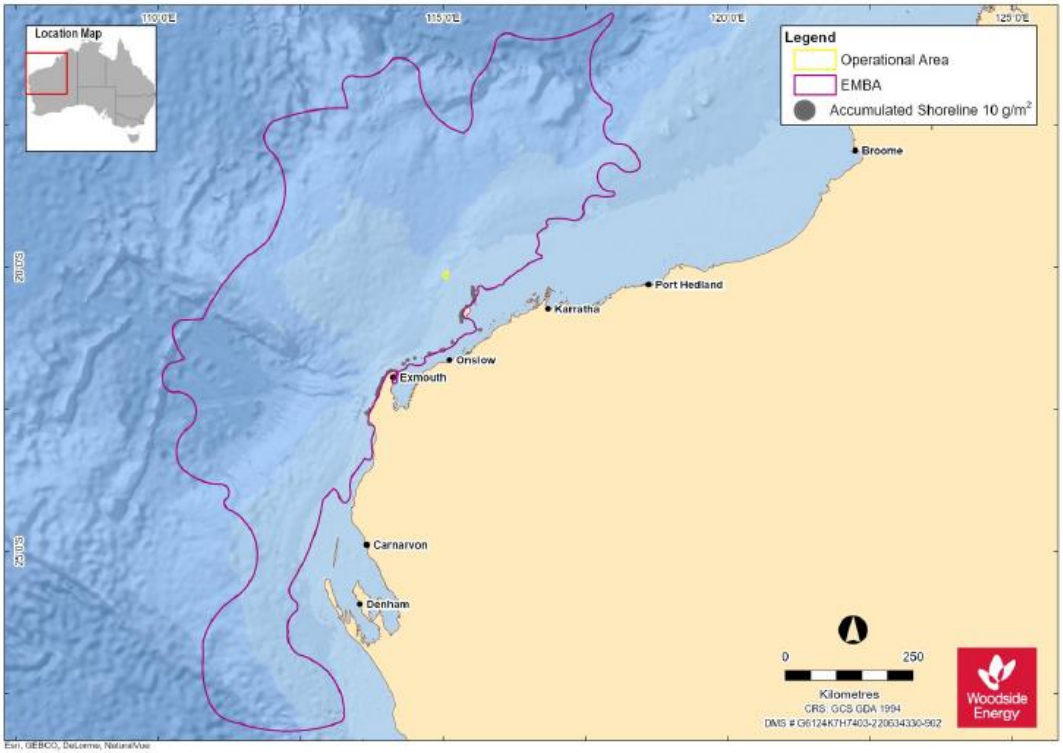
This work program includes Planned Activities but may also result in Unplanned Activities. Both Planned and Unplanned Activities may impact the environment. Woodside manages the work program to reduce impacts and risks to as low as practical.

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, disturbance to the seafloor, discharges from the drill rig, and the marine vessels used for the work may generate underwater noise (including for the surveys), light emissions, atmospheric emissions, and routine discharges (such as sewage, waste, and deck drainage), and other authorised waste.

Unplanned Activities are not planned as part of the work program, but may be the result of an accident, incident, or emergency situation. It is highly unlikely that there will be an Unplanned Activity. Unplanned Activities might include a spill of fuel or oil, a release from the well, accidental collision with marine animals, discharge of unauthorised waste, disturbance to the seabed in an incorrect location, or accidental introduction of invasive species from outside the region. Management measures are in place to reduce the probability and impacts of these unplanned activities to as low as practical.

A table showing all planned and unplanned activities, potential impacts, and management measures for each is included in the attached Information Sheet, Table 2.

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). The location in which the Julimar Appraisal Drilling and Survey 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, 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.



Providing Feedback

If you have an interest in the area of the "environment that may be affected" (EMBA) by this work program and would like more information or have any concerns, you can tell Woodside by calling **1800 442 977** or sending an email to **Feedback@woodside.com.au.** Please contact Woodside before **17th March 2023** so your questions or concerns can be considered during the environmental approval process.

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 projects like this. Woodside has carefully planned this work program so that the risk of environmental impact is reduced to as low as reasonably practical 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

You can find the detailed Consultation Information Sheet for proposed activity on our website: www.woodside.com/sustainability/consultation-activities.

3.3 Advertisement in The Australian, The West Australian, Pilbara News, North West Telegraph, Midwest Times (15 February 2023) and the Geraldton Guardian (17 February 2023)

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 879), Woodside Energy Julimar Pty Ltd (ACN 130 391 365) and Woodside Burrup Pty Ltd (ACN 120 237 416) are proposing to conduct activities in Commonwealth waters as described below:

TPA03 Well Intervention Environment Plan (Woodside Energy Ltd)

Activity summary:	Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir		
Location:	~138 km north-west of Dampier		
Commencement timing:	Anticipated around mid 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~5 to 14 days and will take place 24 hours, 7 days a week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	August 2022

Julimar Drilling and Surveys Environment Plan (Woodside Energy Julimar Pty Ltd)

Activity summary:	Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well and, plug and abandonment of Julimar South-1 if required		
Location:	~182 km west-north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~40 days for drilling and appraisal, ~45 days geophysical and geotechnical surveys and ~21 for decommissioning of the Julimar South-1 well. Activities will be conducted 24 hours per day, seven days per week		
Consultation commenced	August 2022	**First EP submission to NOPSEMA**	Not yet Submitted

WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (Woodside Burrup Pty Ltd)

Activity summary:	Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells		
Location:	~170 km north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~50 days for the PLA08 well, ~70 days per well for well intervention activities and ~30 days for subsea installation activities Activities will be conducted 24 hours per day, 7 days per week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	Not yet Submitted

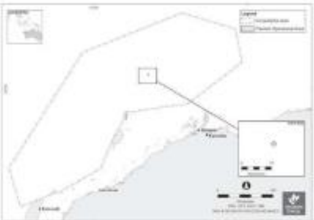


Figure 1

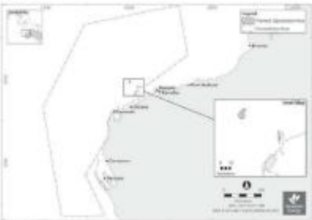


Figure 2

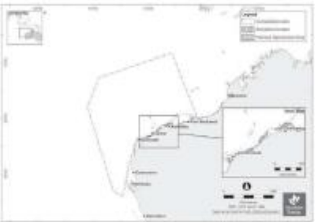


Figure 3

Figure 1 (TPA03), Figure 2 (Julimar) and Figure 3 (WA-34-L Pyxis): Describes the Operational Areas and the Environment That May Be Affected (EMBA) based on a composite of many different paths and furthest distance where a highly unlikely, unplanned event could have an impact 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 identified and will be outlined in the relevant EP.

Impacts associated with the planned activities include the physical presence of a Mobile Offshore Drilling Unit (MODU) and vessels, interaction with other marine users, seabed disturbance (such as infrastructure placement) and other vessel, 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, marine diesel or other vessel fuels), vessel collisions with marine fauna, additional seabed disturbance, introduced marine species, accidental loss of waste or other discharges.

Figure 1, Figure 2 and Figure 3 illustrate indicative EMBAs 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.

Consultation Participation and Feedback

Woodside is seeking to consult with relevant persons to inform the 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 National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: **www.woodside.com/sustainability/consultation-activities** if you would like additional information about these activities. You can also subscribe via our website to receive future information on proposed activities.

If you would like to comment on the proposed activities outlined above, please contact Woodside before Friday, 17 March 2023 via:

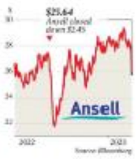
E: **Feedback@woodside.com**
Toll free: **1800 442 977**

18 THE AUSTRALIAN, WEDNESDAY, FEBRUARY 15, 2023
theaustralian.com.au/businessreview

Pandemic hangover hits Ansell's profit

JARED LYNCH

Neil Salmon says 'destocking trends' are more widespread



CSL chief says mRNA vaccines 'no silver bullet'

NOTICES & TENDERS

www.theaustralian.com.au

NEW WOMEN'S AND CHILDREN'S HOSPITAL (South Australia)
SUPPLIERS AND SUBCONTRACTORS – MARKET SOUNDING

Lendlease Construction (Southern) Pty Limited has been awarded the ECI Phase Contract (Early Contractor Involvement) for the above-mentioned project. We are seeking input from local and national **suppliers and subcontractors** in relation to specific trades and services in association with the following:

- Capability and capacity to deliver this project
- Appetite to deliver this project
- Risks associated with this project
- Opportunities associated with this project
- Maximising South Australian Industry Participation outcomes

Project Details

Location	• Main Hospital Site – 1 Gaol Road, Adelaide, South Australia • Western Precinct Carpark – Lot 13 Gaol Road, Adelaide, South Australia
Description of Work	• New Hospital – circa 117,000m2 SoA New Build (multi-storey) • Multi-Deck Carpark – circa 42,000m2 • Pedestrian bridges over railway • External landscaping, roadworks and intersection works
Overall Project Budget	• Government has indicated a potential project cost of approximately $3.0bn to $3.2bn, subject to final resolution
Principal	• SA Health
Project Manager	• SA Health, New WCH Project Management Office

Please note that **this request for feedback is NOT a formal Expression of Interest**, but will assist Lendlease and the Principal in their understanding of market risks and opportunities on this project, including initiatives to expedite the commencement of the works.

Registration and completion of questionnaire - ICN Gateway

Suppliers and subcontractors are asked to visit the ICN Gateway at www.NewWCH.icn.org.au for detailed project information and to complete the market sounding questionnaire.

This project market sounding period will be open from Friday 3 February 2023 until Tuesday 28 February 2023

Please direct all enquiries through the ICN Gateway at www.NewWCH.icn.org.au

'Summer Reading Guide' competition to win a $1000 gift voucher has been won by

IAN Simpson, Denistone West, NSW.

Direct further queries to the bookshop that accepted your entry.

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 879), Woodside Energy Julimar Pty Ltd (ACN 130 391 365) and Woodside Burrup Pty Ltd (ACN 120 237 476) are proposing to conduct activities in Commonwealth waters as described below.

TPA03 Well Intervention Environment Plan (Woodside Energy Ltd)

Activity summary:	Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir		
Location:	~138 km north-west of Dampier		
Commencement timing:	Anticipated around mid 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~5 to 14 days and will take place 24 hours, 7 days a week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	August 2022

Julimar Drilling and Surveys Environment Plan (Woodside Energy Julimar Pty Ltd)

Activity summary:	Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well and, plug and abandonment of Julimar South-1 if required		
Location:	~162 km west-north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~40 days for drilling and appraisal, ~45 days geophysical and geotechnical surveys and ~21 for decommissioning of the Julimar South-1 well. Activities will be conducted 24 hours per day, seven days per week		
Consultation commenced	August 2022	**First EP submission to NOPSEMA**	Not yet Submitted

WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (Woodside Burrup Pty Ltd)

Activity summary:	Drilling and subsea infrastructure installation activities for one well (PL A08) and contingent well intervention activities for current production wells		
Location:	~170 km north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~50 days for the PL A08 well, ~70 days per well for well intervention activities and ~30 days for subsea installation activities Activities will be conducted 24 hours per day, 7 days per week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	Not yet Submitted

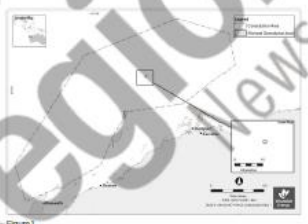


Figure 1

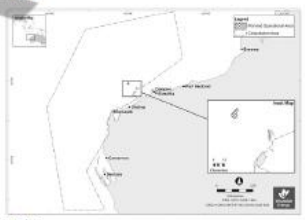


Figure 2

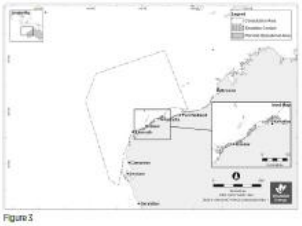


Figure 3

Figure 1 (TPA03), Figure 2 (Julimar) and Figure 3 (WA-34-L Pyxis): Describes the Operational Areas and the Environment That May Be Affected (EMBA) based on a composite of many different paths and furthest distance where a highly unlikely, unplanned event could have an impact 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 identified and will be outlined in the relevant EP.

Impacts associated with the planned activities include the physical presence of a Mobile Offshore Drilling Unit (MODU) and vessels, interaction with other marine users, seabed disturbance (such as infrastructure placement) and other vessel, 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, marine diesel or other vessel fuels), vessel collisions with marine fauna, additional seabed disturbance, introduced marine species, accidental loss of waste or other discharges.

Figure 1, Figure 2 and Figure 3 illustrate indicative EMBAs 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.

Consultation Participation and Feedback

Woodside is seeking to consult with relevant persons to inform the 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 National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: **www.woodside.com/sustainability/consultation-activities** If you would like additional information about these activities. You can also subscribe via our website to receive future information on proposed activities.

If you would like to comment on the proposed activities outlined above, please contact Woodside before Friday, 17 March 2023 via:

E: **Feedback@woodside.com**
Toll free: **1800 442 977**

THE WEST AUSTRALIAN CLASSIFIEDS

WEDNESDAY, FEBRUARY [illegible] 2023 [illegible]

PUBLIC NOTICES

DECEASED ESTATES

[illegible]

Have your say!

Disability Access and Inclusion Plan 2023- 2028

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]

[illegible]

Perth Airport

Perth Airport Abandoned Vehicles

At the discretion of Perth Airport Pty Ltd, under the Airports (Control of On-Airport Activities) Regulations 1997 the following abandoned vehicles will be disposed of if not claimed by 5.00pm (WST) Thursday 9 March 2023.

VIN Number	REGISTRATION	YEAR	MAKE/ MODEL	COLOUR	STATE
[illegible]	No Plates	1998	Kia Sportage	White	WA
[illegible]	No Plates	2009	Toyota Camry	Silver	TAS
[illegible]	No Plates	2006	Nissan Xtrail	Silver	WA
[illegible]	[illegible]	1996	Ford Falcon Ute	White	WA
[illegible]	[illegible]	2001	Toyota Echo	Green	WA
[illegible]	[illegible]	2002	Ford Falcon	Grey	WA
[illegible]	[illegible]	2003	Toyota Echo	Grey	WA
[illegible]	No Plates	2008	Holden Commodore Ute	Green	VIC
[illegible]	No Plates	1998	Toyota Tarago	White	WA
[illegible]	[illegible]	1991	Holden Rodeo	White	WA
[illegible]	No Plates	2003	Toyota Hilux	Blue	WA
[illegible]	No Plates	1992	Hyundai Excel	White	WA

[illegible]

ENVIRONMENT PLANS NOTICE

[illegible]

[illegible] (Woodside Energy Ltd)

Activity summary	[illegible]		
Location	[illegible]		
Commencement timing	[illegible]		
Estimated duration	[illegible]		
Consultation commenced	June 2022	First EP submission to NOPSEMA	August 2022

Julimar Drilling and Survey Environment Plan (Woodside Energy Julimar Pty Ltd)

Activity summary	[illegible]		
Location	[illegible]		
Commencement timing	[illegible]		
Estimated duration	[illegible]		
Consultation commenced	August 2022	First EP submission to NOPSEMA	Not yet Submitted

[illegible] (Woodside [illegible] Pty Ltd)

Activity summary	[illegible]		
Location	[illegible]		
Commencement timing	[illegible]		
Estimated duration	[illegible]		
Consultation commenced	[illegible] 2022	First EP submission to NOPSEMA	Not yet Submitted

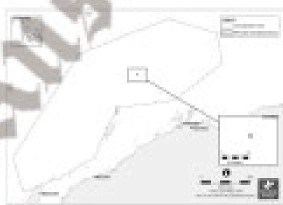


Figure 1

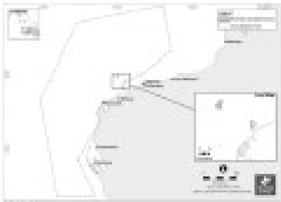


Figure 2

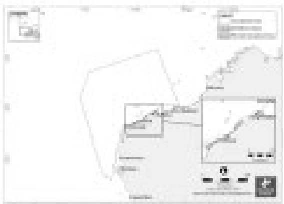


Figure 3

[illegible]

Consultation Participation and Feedback

[illegible]

[illegible]

[illegible]

[illegible]

Page 10 — North West Telegraph February 15, 2023

northwesttelegraph.com.au

PUBLIC NOTICES

Building Regulations 2012

Town of Port Hedland

AMENDMENT TO CLAUSE 1, SCHEDULE 4 OF THE BUILDING REGULATIONS 2012

Notice is hereby given that the Town of Port Hedland (the Town) has initiated the above-mentioned Amendment to the Regulations.

Schedule 4, Clause 1 of the Building Regulations sets out areas of the state (being specific regional or remote areas) where a building permit is not required for certain work. The proposed amendment will remove Port Hedland from Schedule 4, Clause 1.

Further information can be found on the Town's website at www.porthedland.wa.gov.au.

Comments or objections should be lodged with the Town on or before close of business on 22 March 2023, in writing addressed to Development Services, Town of Port Hedland, PO Box 41, Port Hedland WA 6721 or via email: eplanning@porthedland.wa.gov.au

Land Administration Act 1997

Town of Port Hedland

NOTICE OF PUBLIC ADVERTISEMENT OF PEDESTRIAN ACCESS WAY CLOSURE - LOT 3280 STEAMER AVENUE, SOUTH HEDLAND

Notice is hereby given that the Town of Port Hedland (Town) has received an application to close the above-mentioned pedestrian access way.

Details of the proposal are available to view at the Town's Civic Centre during office hours up to and including close of business on 9 March 2023. Any queries can be directed to Development Services on 9158 9300. The proposal can also be viewed on the Town of Port Hedland website at: https://www.porthedland.wa.gov.au/planning-building-and-environment/planning/public-consultation.aspx

Submissions on the proposal may be lodged in writing addressed to Development Services, Town of Port Hedland, PO Box 41, Port Hedland WA 6721 or via email: eplanning@porthedland.wa.gov.au

Submissions should be lodged with the Town on or before close of business on 9 March 2023.

Carl Askew
Chief Executive Officer

Enviro

Enviro Infrastructure wishes to advise local road users of upcoming road closures on North West Coastal Highway, required for critical maintenance works. Closures will be in effect as below:

Bridge 0843 (Robe River Bridge) - Tuesday 28th of February; 10:00PM to 5:00AM

Bridge 0845 (Maitland River Bridge) - Wednesday 1st of March; 10:00PM to 5:00AM

Please monitor the Main Roads WA online travel map for updates.

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 879), Woodside Energy Julimar Pty Ltd (ACN 130 391 365) and Woodside Burrup Pty Ltd (ACN 120 237 416) are proposing to conduct activities in Commonwealth waters as described below:

TPA03 Well Intervention Environment Plan (Woodside Energy Ltd)

Activity summary:	Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir		
Location:	~138 km north-west of Dampier		
Commencement timing:	Anticipated around mid 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~5 to 14 days and will take place 24 hours, 7 days a week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	August 2022

Julimar Drilling and Surveys Environment Plan (Woodside Energy Julimar Pty Ltd)

Activity summary:	Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well and, plug and abandonment of Julimar South-1 if required		
Location:	~182 km west-north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~40 days for drilling and appraisal, ~45 days geophysical and geotechnical surveys and <21 for decommissioning of the Julimar South-1 well. Activities will be conducted 24 hours per day, seven days per week		
Consultation commenced	August 2022	**First EP submission to NOPSEMA**	Not yet Submitted

WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (Woodside Burrup Pty Ltd)

Activity summary:	Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells		
Location:	~170 km north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~50 days for the PLA08 well, ~70 days per well for well intervention activities and ~30 days for subsea installation activities Activities will be conducted 24 hours per day, 7 days per week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	Not yet Submitted

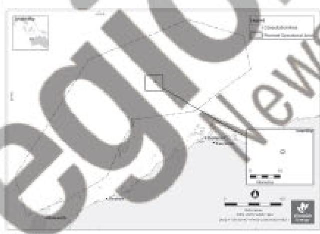


Figure 1

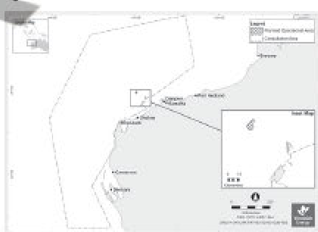


Figure 2

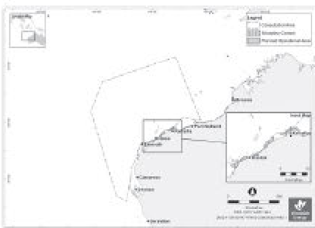


Figure 3

Figure 1 (TPA03), Figure 2 (Julimar) and Figure 3 (WA-34-L Pyxis): Describes the Operational Areas and the Environment That May Be Affected (EMBA) based on a composite of many different paths and furthest distance where a highly unlikely, unplanned event could have an impact 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 identified and will be outlined in the relevant EP.

Impacts associated with the planned activities include the physical presence of a Mobile Offshore Drilling Unit (MODU) and vessels, interaction with other marine users, seabed disturbance (such as infrastructure placement) and other vessel, 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, marine diesel or other vessel fuels), vessel collisions with marine fauna, additional seabed disturbance, introduced marine species, accidental loss of waste or other discharges.

Figure 1, Figure 2 and Figure 3 illustrate indicative EMBAs 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.

Consultation Participation and Feedback

Woodside is seeking to consult with relevant persons to inform the 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 National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: **www.woodside.com/sustainability/consultation-activities** if you would like additional information about these activities. You can also subscribe via our website to receive future information on proposed activities.

If you would like to comment on the proposed activities outlined above, please contact Woodside before Friday, 17 March 2023 via:

E: **Feedback@woodside.com**
Toll free: **1800 442 977**

EMPLOYMENT

BOEING

About Us

Boeing Defence Australia is shaping the future of aerospace and delivering some of the nation's most important programs for the Australian Defence Industry.

Joining us is a chance to make your mark, working with a diverse team that is united in pushing the boundaries of imagination and excellence.

The Opportunity

We are seeking Multiple Skillsets to support data centre, satellite antenna and facilities infrastructure as a part of the Maintenance and Support Services team located at our Geraldton site. Current Opportunities include;

- Configuration Management Specialist
- ICT Installation Technician
- Drafting & Documentation Officer
- Air Conditioning & Refrigeration Mechanic
- Environment Health & Safety Advisor
- Mechanical Fitter
- Facilities & Grounds Supervisor
- General Hand - Facilities & Grounds
- Cleaner
- Painter / Maintainer - Facilities

Culture

At Boeing, we innovate and collaborate to make the world a better place. From the seabed to outer space, you can contribute to work that matters with a company where diversity, equity and inclusion are core values. We're committed to fostering an environment for every teammate that's welcoming, respectful and inclusive, with great opportunity for professional growth. Find your future with us.

We are committed to building a diverse and inclusive workplace. Female applicants, people of Aboriginal or Torres Strait Island descent and veterans are encouraged to apply.

Benefits

- Flexible working options
- Salary packaging
- Employee Incentive Program
- Study assistance
- Global opportunities

Security Clearance

Applicants must be Australian Citizens to meet Australian Government security requirements. You will be required to successfully undergo an Australian Government positive vetting (PV) security clearance.

More information on the security clearance vetting process is available on the Australian Government Security Vetting Agency (AGSVA) website (*https://www.defence.gov.au/security/clearances*).

Equal Opportunity Employer

Boeing is an Equal Opportunity Employer. Employment decisions are made without regard to race, colour, religion, national origin, gender, sexual orientation, gender identity, age, physical or mental disability, genetic factors, military/veteran status or other characteristics protected by law.

If you are ready to join an innovative industry leader and would like to register your interest in working for Boeing, go to the Boeing Defence Australia Careers web page to apply.

https://jobs.boeing.com/ (search city: Geraldton, Western Australia)

Government of Western Australia
Legal Aid WA

Solicitor – Carnarvon Satellite Office

Fixed Term - Full Time – 12 months (possible permanency and/or extension)

Specified Calling Level 3/4, up to $139,705 gross per annum + super + salary sacrifice + benefits + district/air conditioning allowance and subsidised housing.

Are you a talented, enthusiastic and experienced solicitor? In this role you will:

- Operate independently from our satellite office in Carnarvon
- Deliver a range of services across civil, family and criminal law areas.

If you want to know more go to www.jobs.wa.gov.au and search for job vacancy no. LA23028.

CLOSING DATE: 4pm, 20/2/23.

LAWA_13468

COURIER DRIVER
GERALDTON
MR licence, forklift ticket. Must be able to pass drug and alcohol test. Mon-Fri, occasional work weekends. 38hrs+ per week. Starting at $30/hr casual employment. Wage adjustment after probation period.
0436 441 417

EXPERT SERVICES

BOOKKEEPING / BAS AGENT ● 20 YRS EXP
Ph Del 0421 353 423

Share the Important *with* Classifieds

TRANSPORT

TRANSPORT

DEPOTS: PERTH | CARNARVON | KARRATHA | PORT HEDLAND | BROOME | DERBY | KUNUNURRA | DARWIN

CARNARVON - 3 SERVICES PER WEEK
P: 0400 108 607
39 HUDSON STREET, GREYS PLAIN

PERTH – MAIN DEPOT
P: (08) 9259 7500
31 CAROLYN WAY, FORRESTFIELD

sales@bishopstransport.com.au
www.bishopstransport.com.au

WHAT WE OFFER
- GENERAL & REFRIGERATED FREIGHT
- BACKLOADING
- CARS, TRUCKS AND MACHINERY
- BOATS & SEA CONTAINERS
- MINING, OIL & GAS
- STATIONS & REMOTE COMMUNITIES
- HOT SHOTS & EXPRESS SERVICES – available 24/7

Reach a large LOCAL audience with Classifieds

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 879), Woodside Energy Julimar Pty Ltd (ACN 130 391 365) and Woodside Burrup Pty Ltd (ACN 120 237 416) are proposing to conduct activities in Commonwealth waters as described below.

TPA03 Well Intervention Environment Plan (Woodside Energy Ltd)

Activity summary:	Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir		
Location:	~138 km north-west of Dampier		
Commencement timing:	Anticipated around mid 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~5 to 14 days and will take place 24 hours, 7 days a week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	August 2022

Julimar Drilling and Surveys Environment Plan (Woodside Energy Julimar Pty Ltd)

Activity summary:	Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well and, plug and abandonment of Julimar South-1 if required		
Location:	~182 km west-north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~40 days for drilling and appraisal, ~45 days geophysical and geotechnical surveys and ~21 for decommissioning of the Julimar South-1 well. Activities will be conducted 24 hours per day, seven days per week		
Consultation commenced	August 2022	**First EP submission to NOPSEMA**	Not yet Submitted

WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (Woodside Burrup Pty Ltd)

Activity summary:	Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells		
Location:	~170 km north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~50 days for the PLA08 well, ~70 days per well for well intervention activities and ~30 days for subsea installation activities Activities will be conducted 24 hours per day, 7 days per week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	Not yet Submitted

Figure 1

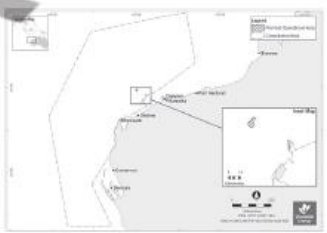


Figure 2

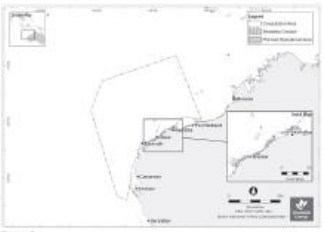


Figure 3

Figure 1 (TPA03), Figure 2 (Julimar) and Figure 3 (WA-34-L Pyxis): Describes the Operational Areas and the Environment That May Be Affected (EMBA) based on a composite of many different paths and furthest distance where a highly unlikely, unplanned event could have an impact 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 identified and will be outlined in the relevant EP.

Impacts associated with the planned activities include the physical presence of a Mobile Offshore Drilling Unit (MODU) and vessels, interaction with other marine users, seabed disturbance (such as infrastructure placement) and other vessel, 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, marine diesel or other vessel fuels), vessel collisions with marine fauna, additional seabed disturbance, introduced marine species, accidental loss of waste or other discharges.

Figure 1, Figure 2 and Figure 3 illustrate indicative EMBAs 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.

Consultation Participation and Feedback

Woodside is seeking to consult with relevant persons to inform the 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 National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: **www.woodside.com/sustainability/consultation-activities** if you would like additional information about these activities. You can also subscribe via our website to receive future information on proposed activities.

If you would like to comment on the proposed activities outlined above, please contact Woodside before Friday, 17 March 2023 via:

E: **Feedback@woodside.com**
Toll free: **1800 442 977**

Trades & Services

9482 2300 Place an ad: regionalclassifieds@wanews.com.au or go to geraldtonguardian.com.au

PLUMBING

Classifieds

9482 2300 Place an ad: regionalclassifieds@wanews.com.au or go to geraldtonguardian.com.au

DEATHS

BURNS (Latham James): 30.12.1936 - 11.02.2023 Formerly of Cunderdin, Balla and Lathlain.

Dearly loved husband of Kay for 61 years. Loved Dad of Sharyn and Andrew, Brad and Raylene. Treasured Pop to Emily and Dorian, Luke, Chelsea, Tom and Celeste. Love you forever.

Private Family Cremation will be held for Latham, and a Celebration of his Life will be held later at a time to be confirmed.

BURNS (Latham): Great Friend and neighbour of Bill and Barbara and the Hamville Family. Will be sadly missed.

Forever in Our Hearts

HARRIS Carmel Rose (nee McCartney): 18.5.1932 - 12.2.2023 Our beautiful and much-loved Mum passed peacefully away on 12th February 2023. Beloved Wife of Keith (dec). Dearly loved Mum of Michael, Carol, Eric, Brett and Peter. Loved Mother-in-Law of Susan, Dave and Gayle. Much loved Nanna of 12 and Special Great Nanna of 17. Forever in our hearts and thoughts.

Our family would like to sincerely thank Dr Ray Borchard, St John of God Nursing Staff and the Palliative Care Nurses for the amazing care given to our Mum and the wonderful support given to her family.

HARRIS (Carmel Rose): Loved Mum to Brett and Gayle. Awesome Nanna to Keegan and Luke, Erin and Callum, Aela. Precious Little Nanna to Avira, Harper and Ezra. We will greatly miss your lovely gentle presence. Thank you for your love selflessness and for the treasured memories we will hold dear always. Rest easy now.

HARRIS (Carmel Rose): 18.5.32 - 12.2.23 Dearly loved Mother of Michael, Mother in law to Sue, Nana of Luke and Ash, Matthew, Christopher and Rhiannon. Little Nana of Jaxon, Sienna, Amalie, Leon, James, Lilly and Fletcher. Gentle Soul now resting in Gods loving arms. Treasured memories are ours to keep and forever in our hearts.

Forever in Our Hearts

HARRIS (Carmel Rose): 18.5.1932 - 12.2.2023 Much loved Mum of Carol and Dave. Devoted Nanna to Daniel and Susan, Andrew and Lauren, Adrian and Kristal, Owen and Nina. Special little Granny to Emily and Eva, Rylaigh, Kash and Knox and Kalani. Our love for you has no boundaries, special memories to keep. Reunited with Dad now and resting in God's loving care.

HARRIS (Carmel): Cherished memories. Rest peacefully Little Granny. Love Andy, Loz and Rylaigh.

FUNERAL NOTICES

HARRIS: Her Family respectfully advise Relatives and Friends, that the Funeral Service lovingly celebrating the life of Mrs Carmel Rose Harris, late of Beachlands, will be held at the Geraldton Crematorium, on Friday (24.02.2023) beginning at 2.00p.m.

evereve Funeral Services
GERALDTON 9964 3767 WFDA

MAZZA: Family and friends of the late Colin Peter Mazza are respectfully informed that a Funeral Service to pay tribute to Colin's life will take place at GERALDTON Crematorium, TUESDAY (21.02.2023) at 10.00am.

VASIC-PIDGEON: Her Family respectfully advise Relatives and Friends, that the Funeral Service lovingly celebrating the life of Mrs Trina Michelle Vasic-Pidgeon, late of Bluff Point, will be held at the Geraldton Crematorium, on Monday (27.02.2023) beginning at 10.00a.m.

evereve Funeral Services
GERALDTON 9964 3767 WFDA

FUNERAL DIRECTORS

PUBLIC NOTICES

mainroads WESTERN AUSTRALIA

Speed Limit Change Chapman Road, City of Greater Geraldton

Main Roads WA advises road users that changes to the speed limit on **Chapman Road will occur on Monday 20 February 2023.**

The existing 60km/h speed zone will be reduced to 50km/h for 2kms from **Phelps St to Cecily St.** The proposed changes will be implemented as part of Main Roads ongoing review of speed limits in the Mid West region and commitment to road safety. Motorists are reminded that speeding is an offence. Further information can be obtained by contacting. Main Roads on 9956 1200.

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 679), Woodside Energy Julimar Pty Ltd (ACN 150 391 365) and Woodside Burrup Pty Ltd (ACN 120 237 485) are proposing to conduct activities in Commonwealth waters as described below.

TPA03 Well Intervention Environment Plan (Woodside Energy Ltd)

Activity summary:	Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir		
Location:	~158 km north-west of Dampier		
Commencement timing:	Anticipated around mid 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~5 to 14 days and will take place 24 hours, 7 days a week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	August 2022

Julimar Drilling and Surveys Environment Plan (Woodside Energy Julimar Pty Ltd)

Activity summary:	Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well and, plug and abandonment of Julimar South-1 if required		
Location:	~182 km west-north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~40 days for drilling and appraisal, ~45 days geophysical and geotechnical surveys and ~21 for decommissioning of the Julimar South-1 well. Activities will be conducted 24 hours per day, seven days per week		
Consultation commenced	August 2022	**First EP submission to NOPSEMA**	Not yet Submitted

WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (Woodside Burrup Pty Ltd)

Activity summary:	Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells		
Location:	~170 km north-west of Dampier		
Commencement timing:	Anticipated around second half of 2023 pending approvals, vessel availability and weather constraints		
Estimated duration:	~50 days for the PLA08 well, ~70 days per well for well intervention activities and ~30 days for subsea installation activities Activities will be conducted 24 hours per day, 7 days per week		
Consultation commenced	June 2022	**First EP submission to NOPSEMA**	Not yet Submitted

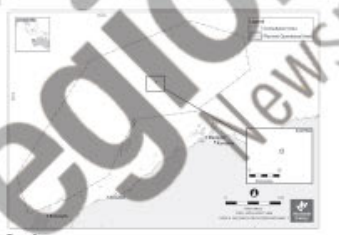


Figure 1

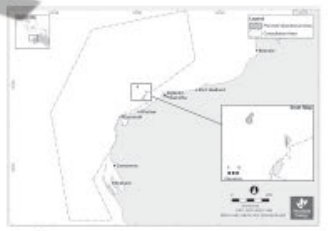


Figure 2

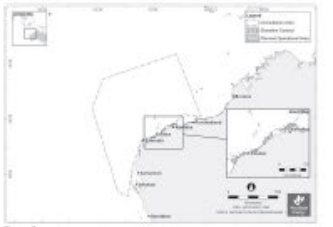


Figure 3

Figure 1 (TPA03), Figure 2 (Julimar) and Figure 3 (WA-34-L Pyxis): Depicts the Operational Areas and the Environment That May Be Affected (EMBA) based on a composite of many different paths and furthest distance where a highly unlikely, unplanned event could have an impact 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 identified and will be outlined in the relevant EP.

Impacts associated with the planned activities include the physical presence of a Mobile Offshore Drilling Unit (MODU) and vessels, interaction with other marine users, seabed disturbance (such as infrastructure placement) and other vessel, drilling and construction impacts (such as noise, light, air emissions and marine discharge). Impacts that could occur due to an unplanned event include hydrocarbon releases (condensates, marine diesel or other vessel fuels), vessel collisions with marine fauna, additional seabed disturbance, introduced marine species, accidental loss of waste or other discharges.

Figure 1, Figure 2 and Figure 3 illustrate indicative EMBAs 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.

Consultation Participation and Feedback

Woodside is seeking to consult with relevant persons to inform the 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 environment regulations administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: **www.woodside.com/sustainability/consultation-activities** If you would like additional information about these activities. You can also subscribe via our website to receive future information on proposed activities.

If you would like to comment on the proposed activities outlined above, please contact Woodside before Friday, 17 March 2023 via:

E: **Feedback@woodside.com**
Toll free **1800 442 977**

3.4 Email sent to ABF, AFMA, AHO, AMSA – Marine Safety, AMSA – Marine Pollution, AMSA – Marine Safety, DPIRD, DCCEEW / DAFF, Director of National Parks, DBCA, DISR, DMIRS (15 February 2023)

Dear Stakeholder

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have additional feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform.	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements,	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.5 Email sent to DoD, DoT (15 February 2023)

Dear Stakeholder

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

Woodside is also consulting on the following additional activity in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**).

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have additional feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m	PLA08: ~820 m

		Proposed Julimar South-1 well location ~ 163 m	
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to

		A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.6 Email sent to Department of Planning, Lands and Heritage (DPLH) (15 February 2023)

Dear Stakeholder

Woodside is planning to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels.

	and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.7 Email sent to Ningaloo Coast World Heritage Advisory Committee (DCWHAC) (15 February 2023)

Dear [redacted]

Woodside is planning to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also

included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

		be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days.

		approximately 21 days to complete, if required.	If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.8 Email sent to North West Slope and Trawl Fishery (4 Licence Holders), Western Deepwater Trawl Fishery (5 Licence Holders) (15 February 2023)

Dear Stakeholder

Woodside is planning to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**); and
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**).

Woodside has previously consulted you on its plans for drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have additional feedback on revised PLA08 EP and/or any specific feedback for each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m

Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply

		MODU to manage vessel movements.	around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.9 Email sent to Commonwealth Fisheries Association (CFA) (15 February 2023)

Dear Stakeholder,

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and

	infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels	MODU General supply/support vessels Survey / AHT vessel	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea

	The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.10 Email sent to Pearl Producers Association (15 February 2023)

Dear Stakeholder,

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a

feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well ntervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their ntegrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well ocation ~ 163 m	PLA08: ~820 m

Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.11 Email sent to Australian Southern Bluefin Tuna Industry Association (ASBTIA) (15 February 2023)

Dear Stakeholder,

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (Julimar EP); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (PLA08 EP).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by 17 March 2023.

Activity:

	Julimar EP	PLA08 EP
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	An approximate 50 km2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used.

		A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:
If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by 17 March 2023.

Regards

3.12 Email sent to WAFIC (16 February 2023)

Dear [redacted]

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development,	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

		completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days.

		approximately 21 days to complete, if required.	If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.
Regards

3.13 Email sent to Recfishwest, Marine Tourism WA, WA Game Fishing Association (16 February 2023)

Dear Stakeholder,

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m	PLA08: ~820 m

		Proposed Julimar South-1 well location ~ 163 m	
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08

		A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.14 Email sent to APPEA, NERA National Energy Resources Australia (NERA) (16 February 2023)

Dear Stakeholder,

Woodside plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform.	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and

	Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels.

	and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.15 Email sent to Exmouth Recreational Marine Users (50 Licence Holders), Karratha Recreational Marine Users (9 Licence Holders) (16 February 2023)

Dear Stakeholder,

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL)	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

		P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days.

		approximately 21 days to complete, if required.	If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.16 Email sent to BP Developments Australia, Chevron Australia, Lightmark Enterprises, Fugro Exploration, INPEX Alpha, Jadestone, KUFPEC, Kyushu Electric Weatstone, Mitsui, PE Wheatstone, Santos, Sapura OMV Upstream / OMV Australia, Shell Australia, Vermillion Oil and Gas, Kato Energy, Coastal Oil and Gas, Bounty Oil and Gas, Carnarvon Energy, ENI Australia, Finder No 9/10/16/17, Exxon Mobil Australia Resources Company and Western Gas (16 February 2023)

Dear Stakeholder,

Woodside plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier

Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea

	manage vessel movements.	JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.17 Email sent to 350A, ACF, AMCS, CCWA, GAP, Cape Conservation Group and Protect Ningaloo (16 February 2023)

Dear Stakeholder,

Woodside plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform.	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and

	Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years).	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels.

	and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.18 Email sent Exmouth Liaison Reference Group - CRG (16 February 2023)

Dear Exmouth Community Liaison Group,

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL)	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

		P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days.

		approximately 21 days to complete, if required.	If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.19 Email sent to Western Australian Museum (16 February 2023)

Dear Stakeholder,

Woodside plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	Julimar EP	PLA08 EP
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m

Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply

		MODU to manage vessel movements.	around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.20 Email sent to Shire of Exmouth (16 February 2023)

Hi [redacted]

(You will also have received this email as a member of the Exmouth CLG)

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements,	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels.

	Vessels will operate 24 hours per day for the duration of the activities.	Vessels will operate 24 hours per day for the duration of the activities.	Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

3.21 Letter sent to Gascoyne Recreational Marine Users (65 Licence Holders), Pilbara/Kimberley Recreational Marine Users (95 Licence Holders) and West Coast Recreational Marine Users (97 Licence Holders) (17 February 2023)

Dear [Stakeholder]
Woodside is providing this update on the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (EP) (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Please see the relevant QR codes below which link directly to Consultation Information Sheets which provide 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 www.woodside.com. You can also subscribe to receive updates on our consultation activities by subscribing through our Consultation Activities page.

TPA03 EP: **Julimar EP:** **PLA08 EP:**

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have included the information in this one letter. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence

		approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

3.22 Letter sent to Gascoyne Demersal Scalefish Fishery (53 Licence Holders), Shark Bay Crab Fishery (31 Licence Holders), Shark Bay Prawn Fishery (18 Licence Holders), Shark Bay Scallop Fishery (29 Licence Holders), West Coast Demersal Scalefish Fishery (48 Licence Holders), West Coast Rock Lobster Managed Fishery (727 Licence Holders) (17 February 2023)

Dear [Stakeholder]

Woodside is providing this update on the following activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Please see the relevant QR codes below which link directly to Consultation Information Sheets which provide 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 www.woodside.com. You can also subscribe to receive updates on our consultation activities by subscribing through our Consultation Activities page.

Julimar EP:

PLA08 EP:

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have included the information in this one letter. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at: Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Activity:

	Julimar EP	**PLA08 EP**
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08

	A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

State-managed fisheries implications:

We note the following overlapping State managed fisheries below.

- Gascoyne Demersal Scalefish Managed Fishery
- Shark Bay Crab Managed Fishery
- Shark Bay Prawn Managed Fishery
- Shark Bay Scallop Managed Fishery
- West Coast Demersal Scalefish (Interim) Managed Fishery
- West Coast Rock Lobster Managed Fishery

3.23 Letter sent to Marine Aquarium Managed Fishery (12 Licence Holders), Mackerel Managed Fishery (Area 2 and 3) (43 Licence Holders), West Coast Deep Sea Crustacean Managed Fishery (7 Licence Holders), Specimen Shell Managed Fishery (29 Licence Holders), Onslow Prawn Managed Fishery (30 Licence Holders), Nickol Bay Prawn Managed Fishery (14 Licence Holders), Western Australian Sea Cucumber Managed Fishery (6 Licence Holders), Exmouth Gulf Prawn (15 Licence Holders), Pilbara Crab Managed Fishery (1 Licence Holder) and Land Hermit Crab Managed Fishery (5 Licence Holders) (17 February 2023)

Dear [Stakeholder]

Woodside is providing this update on the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (EP) (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Please see the relevant QR codes below which link directly to Consultation Information Sheets which provide 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 www.woodside.com. You can also subscribe to receive updates on our consultation activities by subscribing through our Consultation Activities page.

TPA03 EP:

Julimar EP:

PLA08 EP:

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have included the information in this one letter. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

State-managed fisheries implications:

We note the following overlapping State managed fisheries below.

- Exmouth Gulf Beach Seine and Mesh Net Managed Fish
- Exmouth Gulf Prawn Managed Fishery

- Land Hermit Crab Fishery
- Mackerel Managed Fishery (Area 2)
- Mackerel Managed Fishery (Area 3)
- Marine Aquarium Fish Managed Fishery
- Nickol Bay Prawn Managed Fishery
- Onslow Prawn Managed Fishery
- Pilbara Crab Managed Fishery
- Northern Dermersal Scalefish Fishery
    - Pilbara Fish Trawl (Interim) Managed Fishery
    - Pilbara Line Fishery (Condition)
    - Pilbara Trap Managed Fishery
- Specimen Shell Managed Fishery
- West Australian Sea Cucumber Fishery
- West Australian North Coast Shark Managed Fishery
- West Coast Deep Sea Crustacean Managed Fishery

3.24 Email sent to Karratha Community Liaison Group (17 February 2023)

Dear CLG members,

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

Woodside would also like to provide an update on the progressive decommissioning of the Griffin and Stybarrow fields, previously operated by BHP Petroleum Pty Ltd (BHP).

We are providing this information on progressive decommissioning of Griffin and Stybarrow fields to ensure relevant persons are informed about the status of proposed activities, as there have been changes to activity scope and supporting consultation information since consultation commenced for these decommissioning projects in 2021. The Griffin Field is in Commonwealth waters in Petroleum Licence WA-10-L, 65 km northwest of Onslow and 94 km northeast of Exmouth, Western Australia and in water depths of approximately 120 m. The Stybarrow Field is in Commonwealth waters in Petroleum Licence WA-32-L, approximately 53 km northwest of Exmouth, Western Australia and in water depths of approximately 810 – 850 m.

Updated consultation Information Sheets for each of the activities listed above are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) at the bottom of this email which you may wish to use to provide your feedback specific to the proposed EPs.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**	**Griffin Field Decommissioning Activities**	**Stybarrow Field Decommissioning Activities**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.	**Removal Activities** • Removal of subsea equipment (wellheads, trees, distribution skids, risers, flexible flowlines, rigid flowlines, umbilicals, and the pipeline end module (PLEM)). • Removal of the Riser Turret Mooring (RTM) and its moorings. Depending on the vessel utilised, recovery of the RTM may require sections of it to be towed to shallower	**Plugging and Abandonment (P&A) Activities** • Pre-execution activities associated with the well P&A, such as barrier testing and removal of marine growth. • Well P&A of the 10 productions/injection wells by placing cement plugs in the wells to permanently prevent hydrocarbon release. • Cutting and removal of the wellhead and subsea tree assembly. • Unblocking of the H4 flowline, if deemed feasible. **Removal Activities** • Removal of subsea equipment (wellheads, trees, manifolds,

	subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.		water out of the title. • Removal of an exploration wellhead (Ramillies-1 in neighbouring petroleum title WA-12-L). • Ongoing field management activities. • Pigging and subsequent removal of the 26 km of Griffin Gas Export Pipeline (GEP) within Commonwealth waters. **In Situ Activities** Proposal to leave in situ 12 RTM drag anchors (buried), 6 concrete gravity bases and 5 piled foundations for the PLEM and 4 distribution skids.	risers, flexible flowlines, and umbilicals). • Removal of the Disconnectable Turret Mooring (DTM) and its moorings. Recovery of the DTM may require it to be towed to shallower water outside of permit area WA-32-L to support the DTM removal from the marine environment. • Ongoing field management activities (equipment monitoring and inspection). **In Situ Activities** • Proposed leave in situ of the 9 DTM drag anchors (buried), nine suction piles for the riser holdbacks and the historical exploration wellhead, Eskdale-1, which was unable to be removed following its drilling and abandonment in 2003.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title	WA-34-L	WA-10-L	WA-32-L

		area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P			
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier	94 km northeast of Exmouth, Western Australia.	53 km northwest of Exmouth, Western Australia.
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m	Approx. 120 m.	Approx. 810 – 850 m.
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	**Removal Activities** • Earliest proposed removal activity start is estimated to be Q4 2023, subject to approvals, vessel availability and weather constraints. • Facilities removal must be completed no later than 31 December 2024, pursuant to General Direction 832.	**Plugging and Abandonment (P&A) Activities** • Earliest P&A start is estimated to be Q4 2023, subject to approvals, MODU and vessel availability and weather constraints. • P&A activities must be completed no later than 30 September 2024, pursuant to General Direction 833. **Removal Activities** • Earliest facilities and DTM removal is estimated to be Q4 2023, subject to approvals, vessel availability and weather constraints. Equipment removal must be completed no later than 31 March 2025, pursuant to General Direction 833.

Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.	**Removal Activities** Removal activities are anticipated to take approximately 6 months to complete and GEP removal activities are anticipated to take approximately 2 months to complete.	**Plugging and Abandonment (P&A) Activities** • P&A activities are anticipated to take approximately 6 – 9 months. **Removal Activities** Removal activities are anticipated to take approximately 4-6 months to complete and DTM removal activities are anticipated to take approximately 1 month to complete.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to	**Removal Activities** • The temporary Operational Area includes the area encompassing an approximate 1,500 m radius around the equipment. • A temporary 500 m	**P&A Activities** • The Operational Area includes the area encompassing an approximate 3,000 m radius around each of the four drill centers within WA-32-L. • A temporary 500 m exclusion zone will apply around the MODU and the associated project vessels

			Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.	exclusion zone will apply around the project vessels during removal and potential tow activities.	during P&A activities. **Removal Activities** • The temporary Operational Area includes the area encompassing an approximate 1,500 m radius around the subsea infrastructure and wellheads. • The DTM has an existing 1200 m radius petroleum safety zone which will continue to be in place until it is removed. • A temporary 500 m exclusion zone will apply around the CSV and the associated project vessels during removal activities. A temporary 500 m exclusion zone will apply around the HLV and the associated project vessels during the removal of the DTM.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels.	**Removal Activities** • Construction support vessel (CSV) and Heavy Lift Vessel (HLV) for recovery and pipeline removal activities. An anchor handling tug	**P&A activities** • Semi-Submersible Mobile Offshore Drilling Unit (MODU) • The MODU will be supported by 2 to 3 offshore support vessels. **Removal Activities** • CSV and HLV for recovery and activities.

	hours per day for the duration of the activities.	duration of the activities.	Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	(AHT) to support the towing of the RTM to sheltered water.	• AHTs to support the towing of the DTM to the shallower water location (if required).

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Best regards,

3.25 Email sent to City of Karratha (17 February 2023)

Dear [redacted]

Woodside has previously consulted the City of Karratha on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and

- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

Woodside would also like to provide an update on the progressive decommissioning of the Griffin and Stybarrow fields, previously operated by BHP Petroleum Pty Ltd (BHP).

We are providing this information on progressive decommissioning of Griffin and Stybarrow fields to ensure relevant persons are informed about the status of proposed activities, as there have been changes to activity scope and supporting consultation information since consultation commenced for these decommissioning projects in 2021. The Griffin Field is in Commonwealth waters in Petroleum Licence WA-10-L, 65 km northwest of Onslow and 94 km northeast of Exmouth, Western Australia and in water depths of approximately 120 m. The Stybarrow Field is in Commonwealth waters in Petroleum Licence WA-32-L, approximately 53 km northwest of Exmouth, Western Australia and in water depths of approximately 810 – 850 m.

Updated consultation Information Sheets for each of the activities listed above are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) at the bottom of this email which you may wish to use to provide your feedback specific to the proposed EPs.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	Julimar EP	PLA08 EP	Griffin Field Decommissioning Activities	Stybarrow Field Decommissioning Activities
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention	**Removal Activities** • Removal of subsea equipment (wellheads, trees, distribution skids, risers,	**Plugging and Abandonment (P&A) Activities** • Pre-execution activities associated with the well P&A, such as barrier testing and

	from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be	workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.	flexible flowlines, rigid flowlines, umbilicals, and the pipeline end module (PLEM)). • Removal of the Riser Turret Mooring (RTM) and its moorings. Depending on the vessel utilised, recovery of the RTM may require sections of it to be towed to shallower water out of the title. • Removal of an exploration wellhead (Ramillies-1 in neighbouring petroleum title WA-12-L). • Ongoing field management activities. • Pigging and subsequent removal of the 26 km of Griffin Gas Export Pipeline (GEP) within Commonwealth waters.	removal of marine growth. • Well P&A of the 10 productions/injection wells by placing cement plugs in the wells to permanently prevent hydrocarbon release. • Cutting and removal of the wellhead and subsea tree assembly. • Unblocking of the H4 flowline, if deemed feasible. **Removal Activities** • Removal of subsea equipment (wellheads, trees, manifolds, risers, flexible flowlines, and umbilicals). • Removal of the Disconnectable Turret Mooring (DTM) and its moorings. Recovery of the DTM may require it to be towed to shallower water outside of permit area WA-32-L to support the DTM removal from the marine environment. • Ongoing field management activities (equipment monitoring and inspection).

		subject to a future EP.		**In Situ Activities** Proposal to leave in situ 12 RTM drag anchors (buried), 6 concrete gravity bases and 5 piled foundations for the PLEM and 4 distribution skids.	**In Situ Activities** • Proposed leave in situ of the 9 DTM drag anchors (buried), nine suction piles for the riser holdbacks and the historical exploration wellhead, Eskdale-1, which was unable to be removed following its drilling and abandonment in 2003.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L	WA-10-L	WA-32-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier	94 km northeast of Exmouth, Western Australia.	53 km northwest of Exmouth, Western Australia.
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m	Approx. 120 m.	Approx. 810 – 850 m.
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are	**Removal Activities** • Earliest proposed removal activity start is estimated to be Q4 2023, subject to approvals,	**Plugging and Abandonment (P&A) Activities** • Earliest P&A start is estimated to be Q4 2023, subject to approvals, MODU and vessel availability and

	approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	vessel availability and weather constraints. • Facilities removal must be completed no later than 31 December 2024, pursuant to General Direction 832.	weather constraints. • P&A activities must be completed no later than 30 September 2024, pursuant to General Direction 833. **Removal Activities** • Earliest facilities and DTM removal is estimated to be Q4 2023, subject to approvals, vessel availability and weather constraints. Equipment removal must be completed no later than 31 March 2025, pursuant to General Direction 833.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will	**Removal Activities** Removal activities are anticipated to take approximately 6 months to complete and GEP removal activities are anticipated to take approximately 2 months to complete.	**Plugging and Abandonment (P&A) Activities** • P&A activities are anticipated to take approximately 6 – 9 months. **Removal Activities** Removal activities are anticipated to take approximately 4-6 months to complete and DTM removal activities are anticipated to take approximately 1 month to complete.

			take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.		
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.	**Removal Activities** • The temporary Operational Area includes the area encompassing an approximate 1,500 m radius around the equipment. • A temporary 500 m exclusion zone will apply around the project vessels during removal and potential tow activities.	**P&A Activities** • The Operational Area includes the area encompassing an approximate 3,000 m radius around each of the four drill centers within WA-32-L. • A temporary 500 m exclusion zone will apply around the MODU and the associated project vessels during P&A activities. **Removal Activities** • The temporary Operational Area includes the area encompassing an approximate 1,500 m radius around the subsea infrastructure and wellheads. • The DTM has an existing 1200 m radius petroleum safety zone which will continue to be in place until it is removed. • A temporary 500 m exclusion zone will apply around the CSV

					and the associated project vessels during removal activities. A temporary 500 m exclusion zone will apply around the HLV and the associated project vessels during the removal of the DTM.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	**Removal Activities** • Construction support vessel (CSV) and Heavy Lift Vessel (HLV) for recovery and pipeline removal activities. An anchor handling tug (AHT) to support the towing of the RTM to sheltered water.	**P&A activities** • Semi-Submersible Mobile Offshore Drilling Unit (MODU) • The MODU will be supported by 2 to 3 offshore support vessels. **Removal Activities** • CSV and HLV for recovery and activities. • AHTs to support the towing of the DTM to the shallower water location (if required).

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:

Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Best regards,

3.26 Email sent to Onslow Chamber of Commerce and Industry (18 February 2023)

Dear [redacted]

I'm hopeful we can meet in early March to discuss some of our environment plan activities please.

Woodside is providing the Chamber with updated advice on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **20 March 2023**.

Activity:

	TPA03 EP	Julimar EP	PLA08 EP
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m

Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply

		MODU to manage vessel movements.	around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **20 March 2023**.

Regards

3.27 Email sent to Shire of Ashburton (18 February 2023)

Dear [redacted]

Another email on Woodside environment plan activities for the Shire to review please. We're meeting with Ken on 2 March and will provide an update on our activities during this meeting also.

Woodside is providing the Shire with updated advice on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **20 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements,	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels.

	Vessels will operate 24 hours per day for the duration of the activities.	Vessels will operate 24 hours per day for the duration of the activities.	Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **20 March 2023**.

Regards

3.28 Email sent to Robe River Kuruma Aboriginal Corporation (RRKAC) (20 February 2023)

Good morning [redacted]

Further to our recent communications, I attach Summary Information sheets for the following three projects:

- Julimar Appraisal Drilling and Survey Environment Plan
- TPA-03 Well Intervention Environment Plan Environment Plan
- WA-34-L Pyxis Drilling and Subsea Installation Environment Plan

In preparation for the activities in each of the work programs, 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 identified and will be outlined in the Environmental Plan.

We have a number of detailed Consultation Information Sheets, available on our website, which provide further background on the proposed approaches, including a summary of potential key risks and associated management measures for the primary activity and alternative options.

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) of

each these activities. The EMBA is the total area over which unplanned events could have environmental impacts, as set out in the Summary Information sheet attached.

If you would like to speak with us, please let us know by **20 March 2023**. Please also let us know how you would like us to engage with you as soon as possible.

RRKAC can also provide feedback directly to me on the details below, to Feedback@woodside.com.au or 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 feel free to forward this email and, the attached documents to RRKAC members as required. Woodside would be pleased to speak with RRKAC members in addition to the RRKAC Board / office holders.

We look forward to hearing from you.

Kind regards

3.29 Email sent to Western Australian Marine Science Institution (WAMSI) (21 February 2023)

Dear [redacted]

Woodside is planning to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

Woodside is seeking your advice regarding any research activities that WAMSI may be undertaking that may overlap with our proposed activities.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **23 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m

Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV)	MODU General supply/support vessels	A dynamically positioned MODU is intended to be

	General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **23 March 2023**.

Regards

3.30 Email sent to Australian Institute of Marine Science (AIMS) (21 February 2023)

Dear [redacted]

Woodside is planning to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

Woodside is seeking your advice regarding any research activities that AIMS may be undertaking that may overlap with our proposed activities.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **23 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development,	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

		completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.

Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **23 March 2023**.

Regards

3.31 Email sent to Commonwealth Scientific and Industrial Research Organisation (CSIRO) (21 February 2023)

Dear [redacted]

Woodside is planning to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

Woodside is seeking your advice regarding any research activities that CSIRO may be undertaking that may overlap with our proposed activities.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **23 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform.	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

	Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements,	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

		vessel availability, weather or unforeseen circumstances.	
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **23 March 2023**.

Regards

3.32 Email sent to University of Western Australia (UWA) (21 February 2023)

Dear [redacted]

Woodside is planning to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

Woodside is seeking your advice regarding any research activities that UWA may be undertaking that may overlap with our proposed activities.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **23 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m

Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV)	MODU General supply/support vessels	A dynamically positioned MODU is intended to be

	General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **23 March 2023**.

Regards

3.33 Email sent to Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) via the Yamatji Marlpa Aboriginal Corporation (YMAC) (21 February 2023)

Dear [redacted]

Firstly, thank you for your assistance in arranging the meeting between NTGAC and Woodside on 16 February. It was a pleasure to meet the NTGAC Board and YMAC staff. We were most grateful for the opportunity to provide information about our plans and to learn of NTGAC's questions. We will write separately to thank the NTGAC Board for the meeting.

As was discussed during our meeting, please find attached information about Woodside's decommissioning and drilling activities. With the exception of removing the Nganhurra Riser Turret Mooring, for which Woodside seeks NTGAC's feedback soonest, Woodside is seeking feedback on these decommissioning and drilling activities by 17 March. The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. To recap, these activities are:

Decommissioning Activities:

- Removal of the Nganhurra Riser Turret Mooring (RTM). Information about the RTM was previously emailed on 18 January. For ease of reference, the summary information is attached and the consultation information sheet for the RTM can be found at the link below.

    - consultation-information-sheet---nganhurra-operations-cessation-environment-plan-revision.pdf (woodside.com)
- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A), and decommissioning.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

Woodside also looks forward to receiving NTGAC's feedback on the four Scarborough project activities as soon as is possible.

In providing this information and requests for feedback, I acknowledge Radhika's email of 20 February outlining NTGAC's request of Woodside to provide funding for YMAC's in-house environmental scientist to undertake a review of the RTM environmental plan. Ju-Lin O'Connor will be in contact with Radhika directly about this in the coming days.

Thanks again [redacted] for your assistance last week, your consideration of these matters and for your work to progress these important consultations.

Yours sincerely

3.34 Email sent to Yinggarda Aboriginal Corporation - YAC via YMAC (22 February 2023)

Dear [redacted]

I hope this message finds you well.

Further to my correspondence of 18 January regarding Woodside's plan to remove the Nganhurra Riser Turret Mooring (RTM), and Ju-Lin O'Connor's correspondence of 20 January regarding Woodside's Scarborough project, please find attached information about Woodside's decommissioning and drilling activities that we are seeking to consult with Yinggarda Aboriginal Corporation (YAC) about.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside is seeking YAC's feedback as soon as possible, Woodside is seeking YAC's feedback on these decommissioning and drilling activities by 17 March. The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Removal of the Nganhurra Riser Turret Mooring (RTM). Information about the RTM was previously emailed on 18 January. For ease of reference, the summary information is attached and the consultation information sheet for the RTM can be found at the link below.
    - consultation-information-sheet---nganhurra-operations-cessation-environment-plan-revision.pdf (woodside.com)
- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

In providing this information and requests for feedback, I acknowledge Clare's correspondence of 6 February and my response of 10 February in which we discussed arrangements for a meeting between YAC and Woodside. Woodside would be most grateful for the opportunity to meet with YAC, at YAC's earliest convenience, and at a location suitable to YAC. Woodside would also be pleased to provide the resources necessary to hold this meeting and we look forward to receiving a budget for consideration. If there is anything else, we can do at this time to facilitate consultation about these planned work activities please let me know.

Thank you, [redacted] for yours, YAC's and YMAC's consideration of these matters and work to progress these important consultations.

As always, please feel free to contact me on the details below if you require further information or assistance.

Yours sincerely

3.35 Email sent to Buurabalayji Thalanyji Aboriginal Corporation (BTAC) (22 February 2023)

Good afternoon [redacted] I hope your week is travelling well.

I just spoke with Veronica who asked that I forward this correspondence onto you.

Will look forward to catching up in due course.

Kind Regards
Ben

Dear Veronica

Firstly, thank you for your correspondence of 20 February regarding consultations about the Scarborough project. We will respond to this correspondence in the coming days and would be most grateful for the opportunity to meet with you to discuss the matters raised in your letter and our relationship more broadly.

Further to my correspondence of 18 January regarding Woodside's plan to remove the Nganhurra Riser Turret Mooring (RTM), and of 20 January regarding Woodside's Scarborough project, please find attached information about Woodside's decommissioning and drilling activities that we are seeking to consult with Buurabalayji Thalanyji Aboriginal Corporation (BTAC) about.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside is seeking BTAC's feedback as soon as possible, Woodside is seeking BTAC's feedback on these decommissioning and drilling activities by 17 March. The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Removal of the Nganhurra Riser Turret Mooring (RTM). Information about the RTM was previously emailed on 18 January. For ease of reference, the summary information is attached and the consultation information sheet for the RTM can be found at the link below.
    - consultation-information-sheet---nganhurra-operations-cessation-environment-plan-revision.pdf (woodside.com)
- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

We look forward to meeting with you to discuss and respond to the matters raised in your letter, this correspondence, and to discuss other matters important to BTAC and Woodside.

Thank you, [redacted], for yours and Glenys consideration and work to progress these important consultations. We are looking forward to working with BTAC.

As always, please feel free to contact me on the details below if you require further information or assistance.

Yours sincerely

3.36 Email sent to Wirrawandi Aboriginal Corporation (WAC) (24 February 2023)

Good morning [redacted]

I hope your Friday is going well.

I mentioned I would be sharing more information when we met on Tuesday 21 February, to discuss the Environmental Plan (EP) information shared with you to date for Scarborough and Nganghurra RTM. This is the email with further information for Wirrawandi to consider if they have any interests in the Environment that may be affected (EMBA) relative to the attached information sheets.

It would be greatly appreciated if you could please acknowledge receipt and confirm the opportunity to meet with the Wirrawandi board when they are next due to meet in Perth in March.

This email provides information on Woodside's decommissioning and drilling activities that we are seeking to consult with Wirrawandi about.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside is seeking Wirrawandi's feedback as soon as possible, Woodside is seeking Wirrawandi's feedback on these decommissioning and drilling activities by **17 March** 2023. The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Removal of the Nganhurra Riser Turret Mooring (RTM). Information about the RTM was previously emailed on 18 January. For ease of reference, the summary information is attached and the consultation information sheet for the RTM can be found at the link below.
    - consultation-information-sheet---nganhurra-operations-cessation-environment-plan-revision.pdf (woodside.com)
- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

In providing this information and requests for feedback, I acknowledge that we are working towards presenting to the Wirrawandi board at their next board meeting in March. Woodside would be most grateful for the opportunity to meet at Wirrawandi's earliest convenience, and at a location suitable to Wirrawandi. Woodside would also be pleased to provide the resources necessary to hold this meeting and we look forward to receiving a budget for consideration. If there is anything else, we can do at this time to facilitate consultation about these planned work activities please let me know.

Thank you, [redacted] for consideration of these matters and work to progress these important consultations.

Please feel free to contact me on the details below if you require further information or assistance.

Kind regards

3.37 Email sent to JX Nippon Oil & Gas Exploration Corporation (24 February 2023)

Dear [redacted]

Thank you for your response.

Please see attached environment plan consultations that Woodside has sent to JX, but unfortunately has received bounce back messages.

We would be grateful if you could please pass these onto the appropriate JX representative for their consideration and feedback, if any.

We would also be grateful if you could please advise us of the appropriate representative's contact details for future correspondence.

Cheers,

3.38 Email sent to Kariyarra Aboriginal Corporation (24 February 2023)

Hello Nic

In follow up to our telephone conversation on the 27th January please let me know if you have any questions regarding the Environmental Plan (EP) information shared with you to date for Scarborough and Nganghurra RTM.

This email provides further information on Woodside's decommissioning and drilling activities that we are seeking to understand if Kariyarra has any interests in the Environment that may be affected (EMBA) relative to the attached information sheets and if Kariyarra would like us to consult further on these EPs.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside is seeking Kariyarra's feedback as soon as possible, Woodside is also seeking Kariyarra's feedback on these decommissioning and drilling activities by **17 March 2023**. The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

If there is anything else, Woodside can do at this time to facilitate consultation if Kariyarra make an assessment that this is required to provide more information about these planned work activities please let me know.

Thank you for your time in considering these matters.

Please feel free to contact me on the details below if you require further information or assistance.

Kind regards

3.39 Email sent to Murujuga Aboriginal Corporation (MAC) (24 February 2023)

Wayiba [redacted]

I understand that you met with Woodside on Monday 20 February to further discuss the information shared to date on the Nganghurra RTM decommissioning and Scarborough project activity Environmental Plans (EPs). I believe you have been made aware of other EPs we also request your feedback on.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside is seeking MAC's feedback as soon as possible, Woodside is also seeking MAC's feedback on these decommissioning and drilling activities by **17 March 2023**.

The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

Thank you for your time in considering these matters and please feel free to contact me on the details below if you require further information or assistance.

Kind regards

3.40 Email sent to Yindjibarndi Aboriginal Corporation (24 February 2023)

Hello [redacted]

I understand you last spoke with Ju-Lin O'Connor on 25 January regarding the Environmental Plan (EP) information shared with YAC for the Scarborough project activity and Nganghurra RTM.

This email provides further information on Woodside's decommissioning and drilling activities that we are seeking to understand if YAC has any interests in the Environment that may be affected (EMBA) relative to the attached information sheets and if YAC would like us to consult further on these EPs.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which I understand YAC has verbally advised they have no interests, Woodside is also seeking YAC's feedback on these decommissioning and drilling activities by **17 March 2023**.

The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

Thank you for your time in considering these matters. We look forward to hearing from you.

Please feel free to contact me on the details below if you require further information or assistance.

Kind regards

3.41 Email sent to Robe River Kuruma Aboriginal Corporation (RRKAC) (24 February 2023)

Hello [redacted]

I understand you met with [redacted] on 31 January regarding the Environmental Plan (EP) information shared with Robe River Kuruma Aboriginal Corporation (RRKAC) for the Scarborough project activity and Nganghurra RTM and that this information was to be presented at the RRKAC Board meeting this week 21-22 February. Ju-Lin advised we have a number of EPs we will reach out to RRKAC on.

This email provides further information on Woodside's decommissioning and drilling activities that we are seeking to understand if RRKAC has any interests in the Environment that may be affected

(EMBA) relative to the attached information sheets and if RRKAC would like us to consult further on these EPs.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside would appreciate feedback on as soon as possible, Woodside is also seeking RRKAC's feedback on these decommissioning and drilling activities by **17 March 2023**.

The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

Thank you for your time in considering these matters. We look forward to hearing from you.

Please feel free to contact me on the details below if you require further information or assistance.

Kind regards

3.42 Email sent to Ngarluma Aboriginal Corporation (NAC) (24 February 2023)

Good morning [redacted]

I mentioned I would be sharing more information when we met on Friday 17 February, to discuss the Environmental Plan (EP) information shared with you to date for Scarborough and Nganghurra RTM. This is the email with further information for NAC to consider if they have any interests in the EMBA (Environment that may be affected) relative to the attached information sheets.

It would be greatly appreciated if you could please acknowledge receipt and confirm the opportunity to meet with the NAC board when they are next due to meet on 29 or 30 March. We welcome the opportunity to spend a whole day with the board on a different day if that works.

This email provides information on Woodside's decommissioning and drilling activities that we are seeking to consult with NAC about.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside is seeking NAC's feedback as soon as possible, Woodside is seeking NAC's feedback on these decommissioning and drilling activities by **17 March** 2023. The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Removal of the Nganhurra Riser Turret Mooring (RTM). Information about the RTM was previously emailed on 20 January. For ease of reference, the summary information is attached and the consultation information sheet for the RTM can be found at the link below.
    - consultation-information-sheet---nganhurra-operations-cessation-environment-plan-revision.pdf (woodside.com)
- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- TPA03 Well Intervention.
    - Consultation Information Sheet - TPA03 Well Intervention Environment Plan (woodside.com)
- WA-34-L Pyxis Drilling and Subsea Installation.
    - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

In providing this information and requests for feedback, I acknowledge that we are working towards presenting to the NAC board at their next board meeting in March. Woodside would be most grateful for the opportunity to meet with NAC, at NAC's earliest convenience, and at a location suitable to NAC. Woodside would also be pleased to provide the resources necessary to hold this meeting and we look forward to receiving a budget for consideration. If there is anything else, we can do at this time to facilitate consultation about these planned work activities please let me know.

Thank you, [redacted] for consideration of these matters and work to progress these important consultations.

Please feel free to contact me on the details below if you require further information or assistance.

Regards

3.43 Letter sent to Abrolhos Islands and Mid West Trawl Managed Fishery (27 February 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

27 February 2023

Dear Fishery Stakeholder

Woodside is planning to undertake geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**) in Commonwealth waters.

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 on our website.

The Julimar EP has not yet been submitted to NOPSEMA.

If you have feedback on the proposed activities described under the EP, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **29 March 2023**.

Activity:

	Julimar EP
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.
Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P
Location:	~160 km north-west of Dampier
Approx. Water Depth (m):	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m
Schedule:	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

Duration:	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.
Exclusionary / Cautionary Zone:	An approximate 50 km² Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **29 March 2023**.

Regards

Woodside Feedback

Woodside Energy

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

Attached: Consultation Information Sheet

3.44 Letter sent to Exmouth Gulf Beach Seine and Mesh Net Managed Fishery (27 February 2023)

Please direct all responses/queries to:
Woodside Feedback
T: 1800 442 977
E: Feedback@woodside.com.au

Woodside Energy

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

27 February 2023

Dear Fishery Stakeholder

Woodside is planning to undertake the following activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Consultation Information Sheets are attached, which provide 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 on our website.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback on the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **29 March 2023**.

Activity:

	Julimar EP	**PLA08 EP**
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.

Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	An approximate 50 km² Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **29 March 2023**.

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

APPENDIX A

FEEDBACK	**Julimar EP**	**PLA08 EP**

Attached: Julimar EP and PLA08 EP Consultation Information Sheets

3.45 Email sent to Wanparta Aboriginal Corporation (24 February 2023)

Hello [redacted]

In follow up to your email received on 31 January please let me know if you have received any questions from the Wanparta Directors regarding the Environmental Plan (EP) information shared with you to date for Scarborough and Nganghurra RTM.

This email provides further information on Woodside's decommissioning and drilling activities that we are seeking to understand if Wanparta has any interests in the Environment that may be affected (EMBA) relative to the attached information sheets and if Wanparta would like us to consult further on these EPs.

With the exception of removing the Nganhurra RTM and the Scarborough project, for which Woodside is seeking Wanparta's feedback as soon as possible, Woodside is also seeking Wanparta's feedback on these decommissioning and drilling activities by **17 March 2023**.

The plain English summary of each of these activities is attached, and I have provided a link to the more detailed consultation information sheets below. These activities are:

Decommissioning Activities:

- Stybarrow. Plug and abandonment (P&A) of the wells.
  - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
- Griffin decommissioning.
  - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)

Drilling Activities:

- WA-34-L Pyxis Drilling and Subsea Installation.
  - Consultation Information Sheet - WA-34-L Pyxis Drilling and Subsea Installation Environment Plan (woodside.com)
- Julimar Appraisal Drilling.
  - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

If there is anything else, Woodside can do at this time to facilitate consultation, if Wanparta make an assessment that this is required to provide more information about these planned work activities, please let me know.

Thank you for your time in considering these matters.

Please feel free to contact me on the details below if you require further information or assistance.

Kind regards

[redacted]

3.46 Email sent to Western Rock Lobster Council (16 February 2023)

Thank you [redacted]

[redacted] – I would welcome the opportunity to discuss with you the activities we are currently planning and seeking to consult with your members.

An option would be for me to send you the relevant information for you to send to your members, or we can send letters directly.

We will be guided by you as to what you think will be the most appropriate to ensure Rock Lobster operators know and understand our activities and are able to provide us with feedback.

For example there are 6 Environment Plan Information Factsheets that we have released this week that we would like to share with your members.

Could you please give me a call on 0427018766 and advise how you would like to proceed.

Attached are relevant QR Codes which link directly to each of the Information Fact Sheets on our website.

Thanks
[redacted]

3.47 Email sent to Western Tuna and Billfish Fishery (4 Licence Holders) (15 February 2023)

Dear Stakeholder,

Woodside is planning to undertake the following activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	Julimar EP	**PLA08 EP**
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties.	Drill and develop the proposed PLA08 production well.

	Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete.

	Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

4. Additional Consultation (March 2023)

4.1 Email sent to Western Rock Lobster Council (14 March 2023)

Hi [redacted]

I hope your week is going well.

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on Woodside's proposed activities in Commonwealth waters. Please see our consultation email below.

Feedback by 20 March 2023

- Seabed intervention and trunkline installation activities for the section of the Trunkline in Commonwealth waters under the **Scarborough Seabed Intervention and Trunkline Installation EP** for the Scarborough development.
- Decommissioning of the Nganhurra RTM under the **Nganhurra Operations Cessation Environment Plan revision**.

Feedback by 25 March 2023

- Subsea decommissioning activities for the Griffin field under the **Griffin Decommissioning and Field Management EP, Griffin Gas Export Pipeline EP** and **Griffin Field Deviation EP**.
- Subsea decommissioning activities for the Stybarrow field under the **Stybarrow Plug and Production EP, Stybarrow Decommissioning and Field Management EP** and **Stybarrow Field Deviation EP**.
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the **Julimar Drilling and Surveys Environment Plan**.
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the **WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision**.

In an effort to simplify feedback, we have included a feedback template **(Appendix A)** which you may wish to use to provide your feedback specific to the proposed EPs.

We would appreciate any feedback you may have by the above feedback dates to support the development of our Environment Plans.

Kind regards,

4.2 Email sent to AHO (7 March 2023)

Dear AHO,

Woodside previously consulted you (email below) on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (TPA03 EP);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (Julimar EP); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (PLA08 EP).

The Shipping Lane figure for the proposed activities Operational Areas is attached. A separate figure showing the Environment that May Be Affected (EMBA) for the proposed activities is also been attached for reference.

Please let us know should you have any feedback relating to the proposed activities by 17 March 2023.

Kind Regards,

4.3 Email sent to ABF, AFMA, AMSA – Marine Pollution, DPIRD, DCCEEW / DAFF – Fisheries and Biosecurity, Director of National Parks, DISR and DMIRS (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.4 Email sent to DoD (7 March 2023)

Dear Department of Defence

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

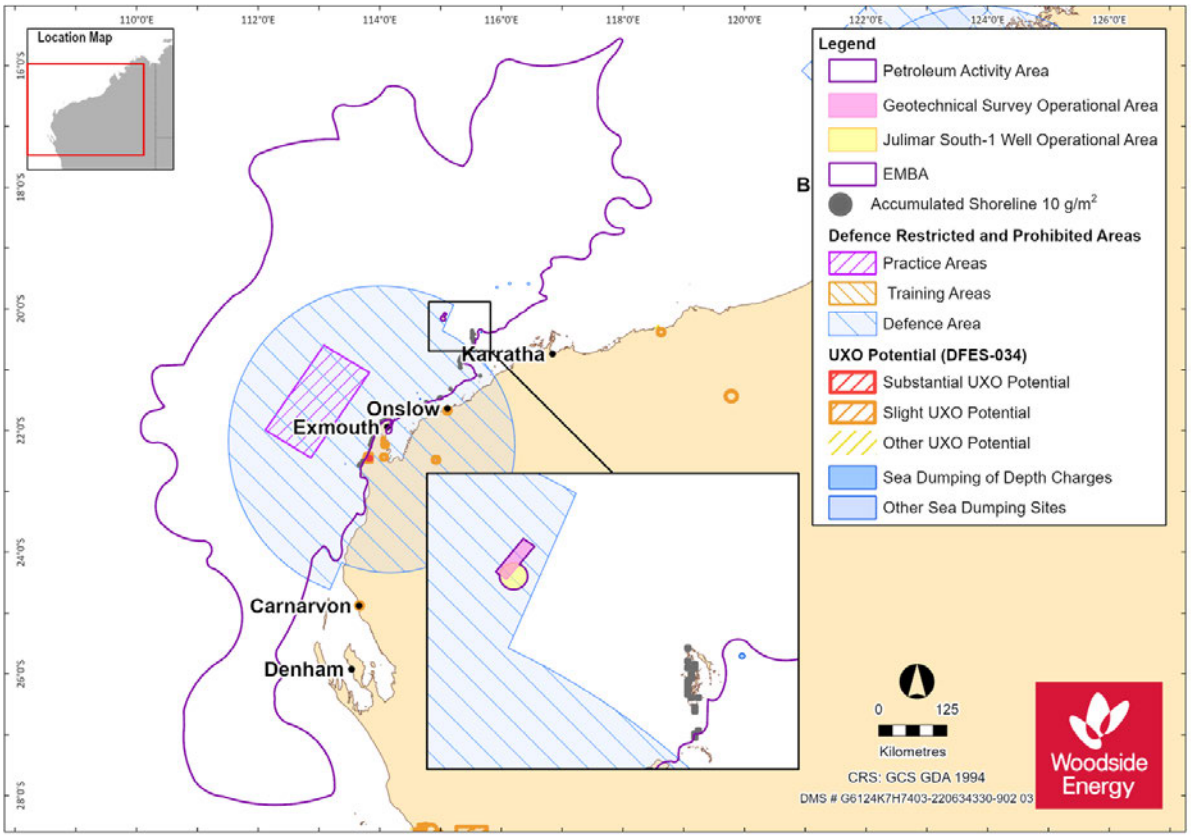
- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);

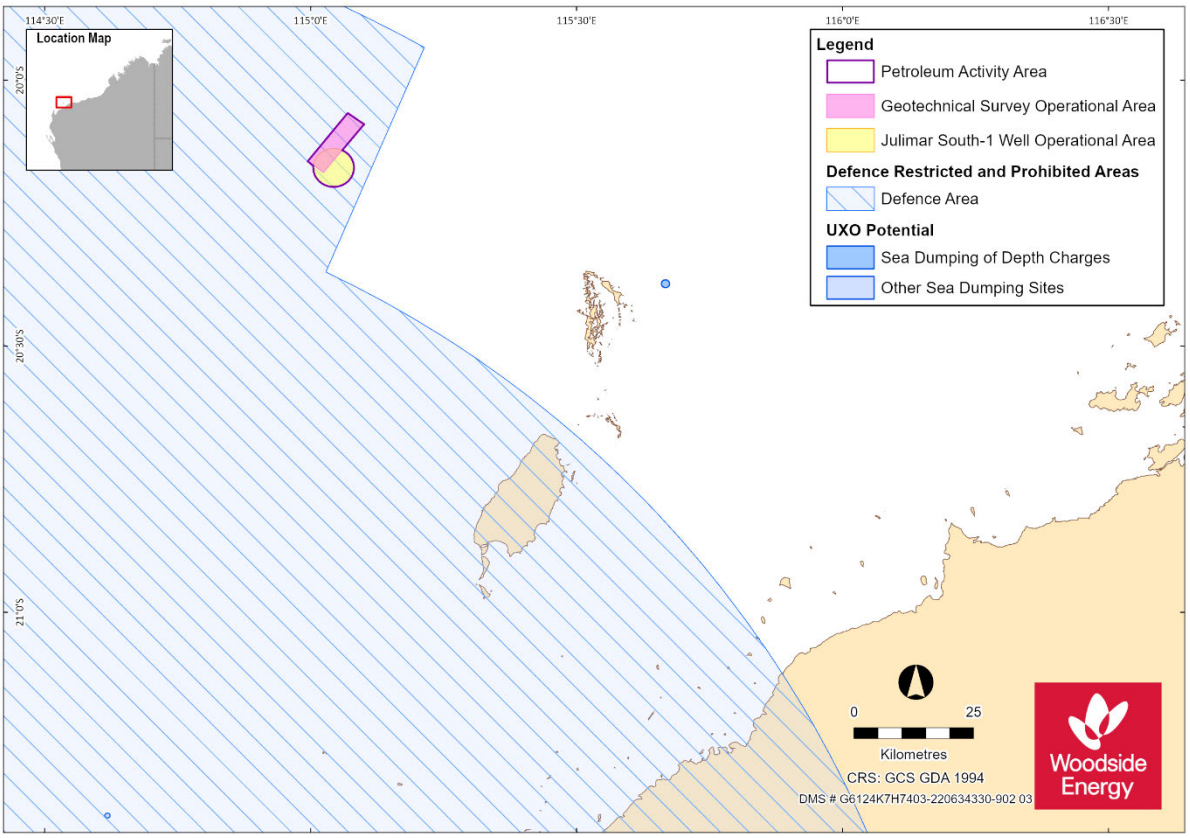
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

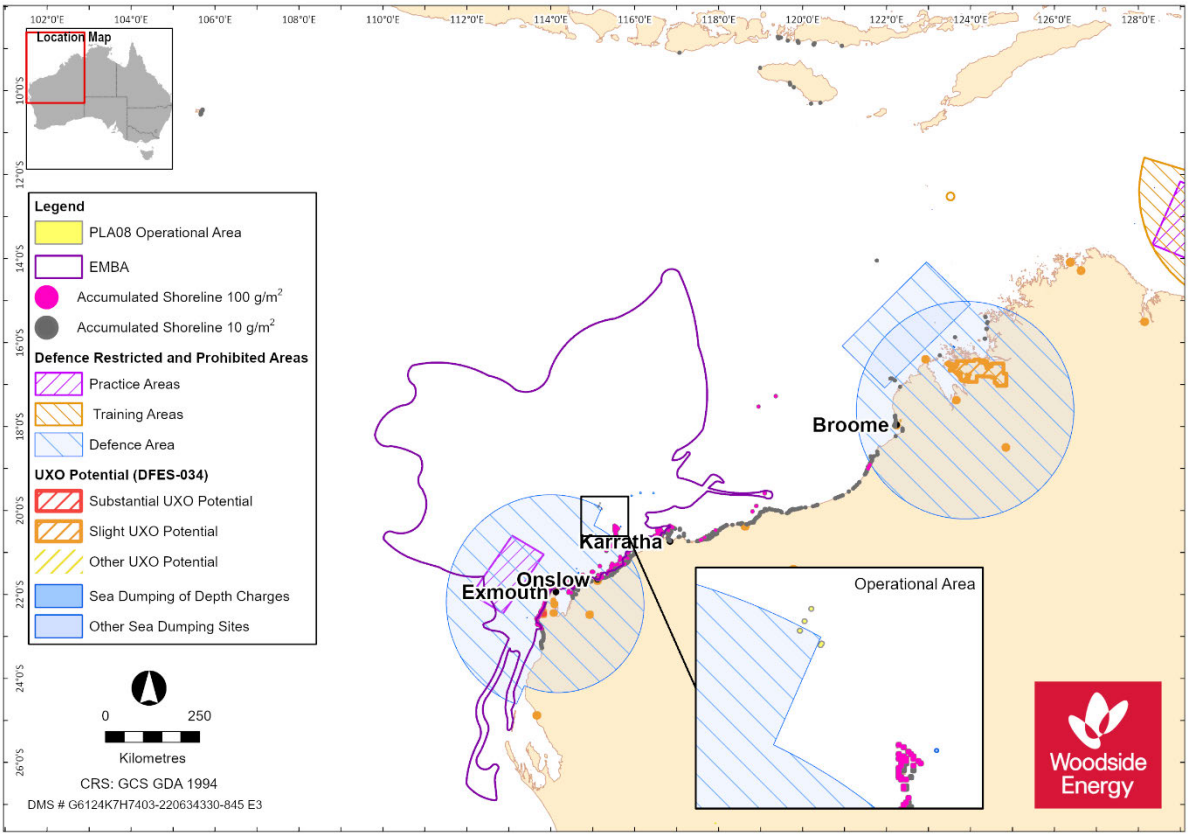
The Defence figure for the proposed environment plans as relevant to their Petroleum Activities Program and associated Operational Areas is attached. A separate figure showing the Environment that May Be Affected (EMBA) for each environment plan is also attached for reference.

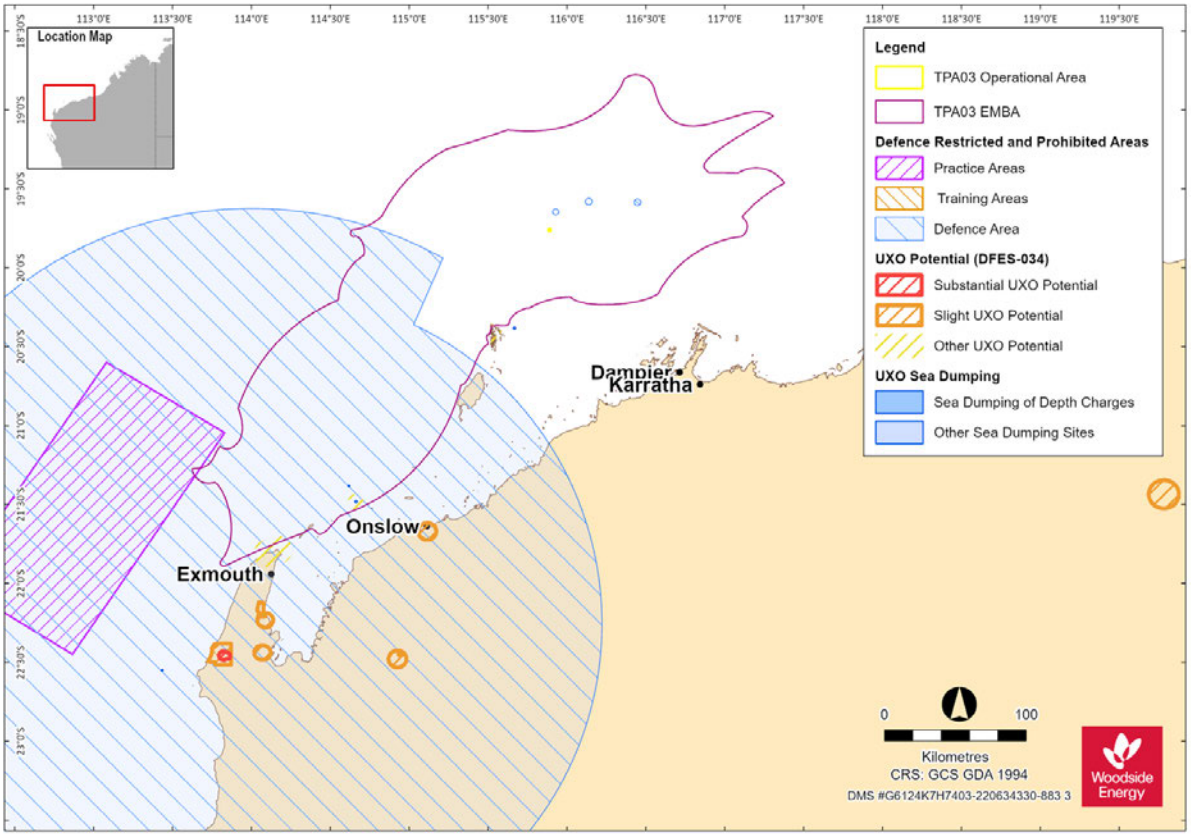
We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

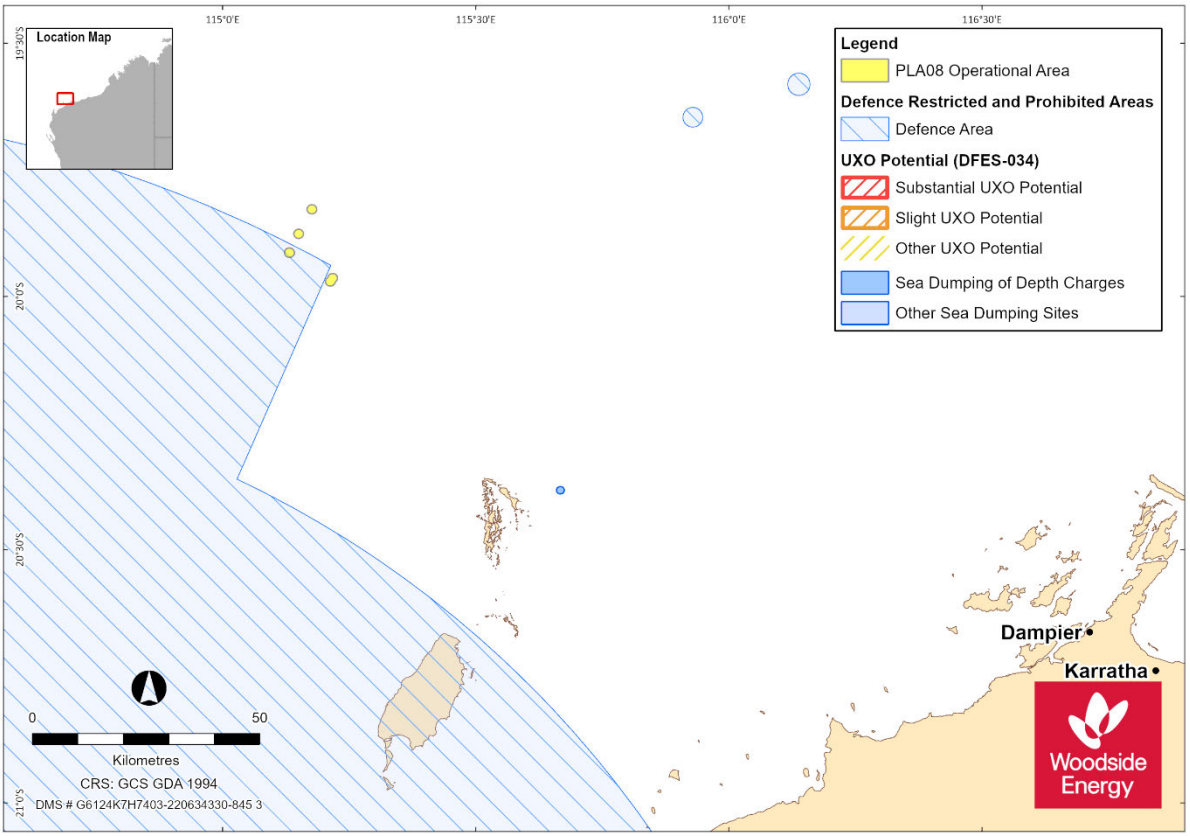
Kind regards,

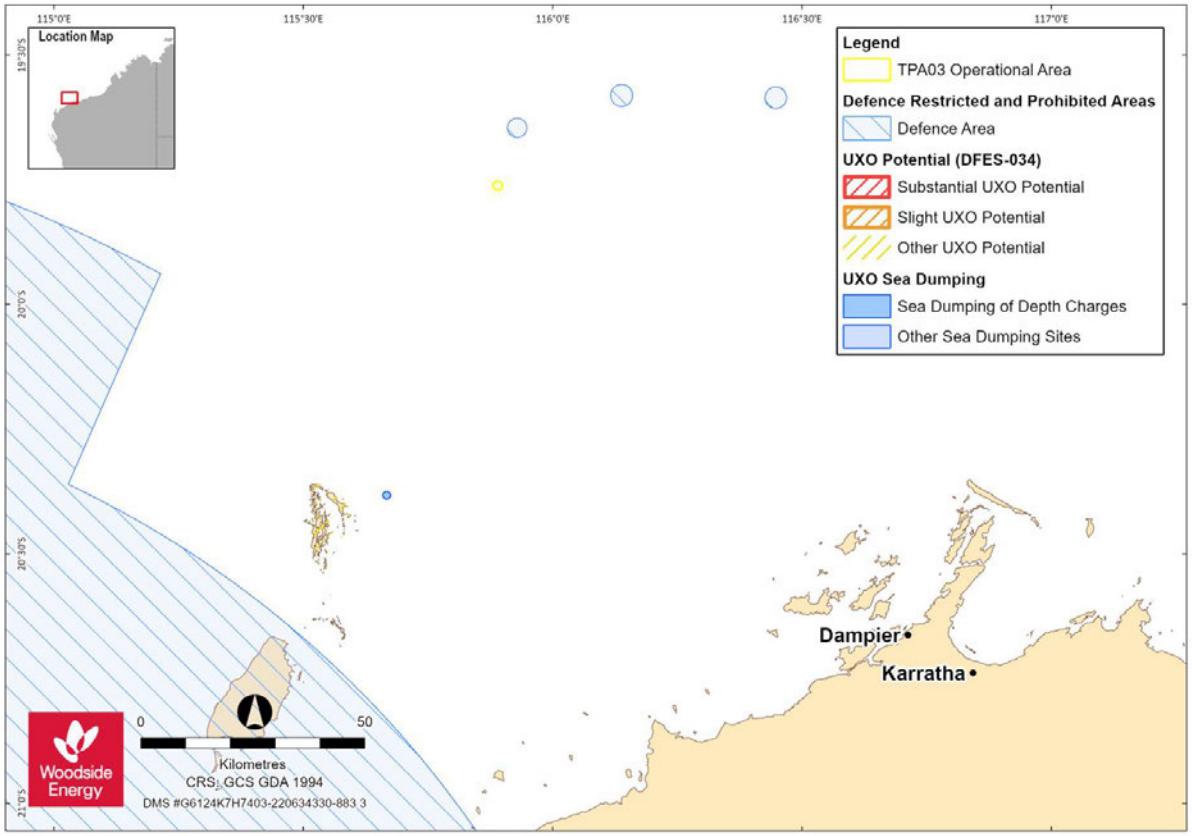



Location Map
Legend
Petroleum Activity Area
Geotechnical Survey Operational Area
Julimar South-1 Well Operational Area
Defence Restricted and Prohibited Areas
Defence Area
UXO Potential
Sea Dumping of Depth Charges
Other Sea Dumping Sites
0
25
Kilometres
CRS: GCS GDA 1994
DMS # G6124K7H7403-220634330-902 03
Woodside Energy


Location Map
Legend
PLA08 Operational Area
EMBA
Accumulated Shoreline 100 g/m2
Accumulated Shoreline 10 g/m2
Defence Restricted and Prohibited Areas
Practice Areas
Training Areas
Defence Area
UXO Potential (DFES-034)
Substantial UXO Potential
Slight UXO Potential
Other UXO Potential
Sea Dumping of Depth Charges
Other Sea Dumping Sites
0
250
Kilometres
CRS: GCS GDA 1994
DMS # G6124K7H7403-220634330-845 E3
Broome
Karratha
Onslow
Exmouth
Operational Area
Woodside Energy


Location Map
Legend
TPA03 Operational Area
TPA03 EMBA
Defence Restricted and Prohibited Areas
Practice Areas
Training Areas
Defence Area
UXO Potential (DFES-034)
Substantial UXO Potential
Slight UXO Potential
Other UXO Potential
UXO Sea Dumping
Sea Dumping of Depth Charges
Other Sea Dumping Sites
Dampier
Karratha
Onslow
Exmouth
0
100
Kilometres
CRS: GCS GDA 1994
DMS #G6124K7H7403-220634330-883 3
Woodside Energy


Location Map
Legend
PLA08 Operational Area
Defence Restricted and Prohibited Areas
Defence Area
UXO Potential (DFES-034)
Substantial UXO Potential
Slight UXO Potential
Other UXO Potential
Sea Dumping of Depth Charges
Other Sea Dumping Sites
Dampier
Karratha
0
50
Kilometres
CRS: GCS GDA 1994
DMS # G6124K7H7403-220634330-845 3
Woodside Energy



4.5 Email sent to Department of Planning, Lands and Heritage (DPLH) (7 March 2023)

Dear DPLH

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.6 Email sent to Ningaloo Coast World Heritage Advisory Committee (NCWHAC) (7 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.7 Email sent to North West Slope and Trawl Fishery (4 Licence Holders) (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.8 Email sent to Western Deepwater Trawl Fishery (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.9 Email sent to Pearl Producers Association (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.10 Email sent to WAFIC (7 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.11 Email sent to Recfishwest, Marine Tourism WA and WA Game Fishing Association (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.12 Email sent to Exmouth Recreational Marine Users (50 Licence Holders), Karratha Recreational Marine Users (9 Licence Holders) (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.13 Email sent to BP Developments Australia, Chevron Australia, Lightmark Enterprises, Fugro Exploration, INPEX Alpha, Jadestone, KUFPEC, Kyushu Electric Wheatstone, Mitsui, PE Wheatstone, Santos, Sapura OMV Upstream / OMV Australia, Shell Australia, Vermillion Oil and Gas, Kato Energy, Coastal Oil and Gas, Bounty Oil and Gas, Carnarvon Energy, ENI Australia, Finder No 9/10/16/17, Exxon Mobil Australia Resources Company and Western Gas (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.14 Email sent to 350 Australia, Australian Conservation Foundation (ACF), Australian Marine Conservation Society (AMCS), Conservation Council of Western Australia (CCWA), Greenpeace Australia Pacific (GAP), Cape Conservation Group (CCG) and Protect Ningaloo (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.15 Email sent to APPEA, NERA (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.16 Email sent to Exmouth Liaison Reference Group - CRG (7 March 2023)

Dear Exmouth Community Reference Group

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.17 Email sent to Shire of Exmouth (7 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.18 Email sent to WAMSI (7 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **23 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.19 Email sent to Australian Institute of Marine Science (AIMS) (7 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **23 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.20 Email sent to CSIRO (7 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and

- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **23 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.21 Email sent to University of Western Australia (UWA) (7 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **23 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.22 Email sent to JX Nippon (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.23 Email sent to Western Tuna and Billfish Fishery (4 Licence Holders) (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.24 Email sent to Australian Southern Bluefin Tuna Industry Association (ASBTIA) (7 March 2023)

Dear Stakeholder

Woodside is sending this email by way of a reminder that the consultation period is closing soon to provide feedback on the following proposed activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Kind regards,

4.25 Email sent to Karratha Community Liaison Group (8 March 2023)

Dear CLG members,

Woodside is sending this email by way of a reminder that the consultation period to provide feedback on the following proposed activities in Commonwealth waters, is closing soon:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**);
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**);
- Decommissioning of the Griffin field under the Griffin Decommissioning and Field Management EP, Griffin Gas Export Pipeline EP and Griffin Field Deviation EP; and
- Decommissioning of the Stybarrow field under the Stybarrow Plug and Abandonment EP, Stybarrow Decommissioning and Field Management EP and Stybarrow Field Deviation EP.

We would appreciate any feedback you may have by **17 March 2023** to support our development of the proposed environment plans.

Best regards,

4.26 Email sent to City of Karratha (8 March 2023)

Hi [redacted]

Woodside is sending this email by way of a reminder that the consultation period to provide feedback on the following proposed activities in Commonwealth waters, is closing soon:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (TPA03 EP);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (Julimar EP);
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (PLA08 EP);
- Decommissioning of the Griffin field under the Griffin Decommissioning and Field Management EP, Griffin Gas Export Pipeline EP and Griffin Field Deviation EP; and
- Decommissioning of the Stybarrow field under the Stybarrow Plug and Abandonment EP, Stybarrow Decommissioning and Field Management EP and Stybarrow Field Deviation EP.

We would appreciate any feedback you may have by 17 March 2023 to support our development of the proposed environment plans.

Best regards,

4.27 Email sent to Shire of Ashburton (8 March 2023)

Hi [redacted]

It was good to meet with you both last week. Thanks for your time and the brief discussion had on environment plan consultation.

As requested, we will continue to send advice to the Shire of Ashburton (via both of you).
Please find below and attached consultation advice that we're seeking feedback from the Shire on by 20 March 2023. Please get in touch if you require additional information at this time.

Regards

4.28 Email sent to Onslow Chamber of Commerce and Industry (8 March 2023)

Hi [redacted]

It was good to meet with you last week in Onslow.

I understand from our meeting, that you on-forward EP consultation materials to your Board members for their awareness and further distribution (if required). I also understand that OCCI is unlikely to respond to consultation materials. I intend to periodically check-in on any changes to this process and to understand any informal feedback that OCCI may have heard from members. We will continue to share consultations materials.

If you wish to provide feedback specific to each of the proposed activities described under the relevant EPs, we ask OCCI to please respond by 20 March 2023.
Thanks

4.29 Email sent to Pilbara Line Fishery (9 Licence Holders), Pilbara Trap Fishery (6 Licence Holders) and Pilbara Trawl Fishery (7 Licence Holders) (8 March 2023)

Dear Fishery Stakeholder,

Woodside previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **17 March 2023**.

Activity:

	TPA03 EP	**Julimar EP**	**PLA08 EP**
Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L

Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m
Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.

Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **17 March 2023**.

Regards

4.30 Letter sent to Marine Aquarium Managed Fishery (12 Licence Holders), Mackerel Managed Fishery (Area 2 and 3) (43 Licence Holders), West Coast Deep Sea Crustacean Managed Fishery (7 Licence Holders), Specimen Shell Managed Fishery (29 Licence Holders), Onslow Prawn Managed Fishery (30 Licence Holders), Nickol Bay Prawn Managed Fishery (14 Licence Holders), Western Australian Sea Cucumber Managed Fishery (6 Licence Holders), Exmouth Gulf

Prawn (15 Licence Holders), Pilbara Crab Managed Fishery (1 Licence Holder) and Land Hermit Crab Managed Fishery (5 Licence Holders) (9 March 2023)

Please direct all responses/queries to:
Woodside Feedback
T: 1800 442 977
E: feedback@woodside.com

Woodside Energy (Australia) Pty Ltd
ACN 008 925 879
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T +61 8 9348 4000
www.woodside.com

9 March 2023

Attn: [Stakeholder]
[Company]
[Address]

Dear Stakeholder

Woodside previously consulted you (correspondence dated 17 February 2023) on Woodside's following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (EP) (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Please see the relevant QR codes below which link directly to Consultation Information Sheets which provide 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 www.woodside.com.

TPA03 EP: **Julimar EP:** **PLA08 EP:**

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

We would appreciate any feedback you may have by **17 March 2023** to support the development of our proposed environment plans.

Kind 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

4.31 Letter sent to Gascoyne Recreational Marine Users (65 Licence Hodlers), Pilbara/Kimberley Recreational Marine Users (95 Licence Holders) and West Coast Recreational Marine Users (97 Licence Holders) (9 March 2023)

Please direct all responses/queries to:
Woodside Feedback
T: 1800 442 977
E: feedback@woodside.com

Woodside Energy

Woodside Energy (Australia) Pty Ltd
ACN 006 923 679
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T +61 8 9348 4000
www.woodside.com

9 March 2023

Attn: [Stakeholder]
[Company]
[Address]

Dear Stakeholder

Woodside previously consulted you (correspondence dated 17 February 2023) on Woodside's following proposed activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (EP) (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Please see the relevant QR codes below which link directly to Consultation Information Sheets which provide 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 www.woodside.com.

TPA03 EP: **Julimar EP:** **PLA08 EP:**

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

We would appreciate any feedback you may have by **17 March 2023** to support the development of our proposed environment plans.

Kind 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

4.32 Letter sent to Gascoyne Demersal Scalefish Fishery (53 Licence Holders), Shark Bay Crab Fishery (31 Licence Holders), Shark Bay Prawn Fishery (18 Licence Holders), Shark Bay Scallop Fishery (29 Licence Holders), West Coast Demersal Scalefish Fishery (48 Licence Holders), West Coast Rock Lobster Managed Fishery (727 Licence Holders) (9 March 2023)

Please direct all responses/queries to:
Woodside Feedback
T: 1800 442 977
E: feedback@woodside.com

Woodside Energy

Woodside Energy (Australia) Pty Ltd
ACN 008 923 879
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T +61 8 9348 4000
www.woodside.com

09 March 2023

Attn: [Stakeholder]
[Company]
[Address]

Dear Stakeholder

Woodside previously consulted you (correspondence dated 17 February 2023) on Woodside's following proposed activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Please see the relevant QR codes below which link directly to Consultation Information Sheets which provide 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 www.woodside.com.

Julimar EP:

PLA08 EP:

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

We would appreciate any feedback you may have by **17 March 2023** to support the development of our proposed environment plans.

You can also subscribe on our website to receive Consultation Information Sheets for proposed activities: **www.woodside.com/sustainability/consultation-activities**.

Kind 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

4.33 Email sent to JX Nippon Oil & Gas Exploration Corporation (10 March 2023)

Dear [redacted]

Woodside is sending this email by way of a reminder that the consultation period has closed to provide feedback on the following proposed activities in Commonwealth waters:

- seabed intervention and trunkline installation activities for the section of the Trunkline in Commonwealth waters under the Scarborough Seabed Intervention and Trunkline Installation EP (**SITI EP**).
- 4D baseline marine seismic survey (MSS) activities over the Scarborough and Jupiter field under the Scarborough 4D Baseline Marine Seismic Survey EP (**Seismic EP**).
- seabed site surveys and installation of subsea production infrastructure under the Subsea Infrastructure Installation EP (**Subsea EP**).

The feedback period is also closing soon for the following proposed activities in Commonwealth waters:

- activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**).
- drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).
- subsea decommissioning activities for the Griffin field under the **Griffin Decommissioning and Field Management EP, Griffin Gas Export Pipeline EP** and **Griffin Field Deviation EP**.
- subsea decommissioning activities for the Stybarrow field under the **Stybarrow Plug and Production EP, Stybarrow Decommissioning and Field Management EP** and **Stybarrow Field Deviation EP**.

Please find the attached Consultation Information Sheets relating to the above proposed environment plans (EPs). The Consultation Information Sheets provide background on the proposed activities, including maps, 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.

Should JX have feedback on the proposed activities, please let us know. Feedback received after the feedback dates (see emails attached) will continue to be assessed and responded to, as required, through the life of the relevant EP.

As we have invited consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

4.34 Email sent to Carnarvon Chamber (10 March 2023)

Dear Carnarvon Chamber

Woodside is planning to undertake geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**) in Commonwealth waters.

Following recent changes to Commonwealth Environment Plan consultation requirements, Woodside is now consulting stakeholders whom are located within the environment that may be affected (EMBA) by a proposed petroleum activity, which includes the Carnarvon Chamber.

The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this environmental plan, 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 EMBA for this 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.

A Consultation Information Sheet is attached, which provide 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 Julimar EP PLA08 EP has not yet been submitted to NOPSEMA.

If you have feedback specific to the proposed activities described under the EP, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **9 April 2023**.

Activity:

	Julimar EP
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.
Permit area:	Drilling: WA-49-L

	Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P
Location:	~160 km north-west of Dampier
Approx. Water Depth (m):	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m
Schedule:	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.
Exclusionary / Cautionary Zone:	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **9 April 2023**.

Regards

4.35 Email sent to Shire of Carnarvon (10 March 2023)

Dear Shire of Carnarvon

Woodside is planning to undertake geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**) in Commonwealth waters.

Following recent changes to Commonwealth Environment Plan consultation requirements, Woodside is now consulting stakeholders whom are located within the environment that may be affected (EMBA) by a proposed petroleum activity, which includes the Carnarvon Chamber.

The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this environmental plan, 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 EMBA for this 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.

A Consultation Information Sheet is attached, which provide 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 Julimar EP PLA08 EP has not yet been submitted to NOPSEMA.

If you have feedback specific to the proposed activities described under the EP, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **9 April 2023**.

Activity:

	Julimar EP
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period).

	• If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.
Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P
Location:	~160 km north-west of Dampier
Approx. Water Depth (m):	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m
Schedule:	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.
Exclusionary / Cautionary Zone:	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the MODU to manage vessel movements.
Vessels:	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **9 April 2023**.

Regards

4.36 Email sent to Tuna Australia (13 March 2023)

Dear [redacted]

Woodside has previously consulted you on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Updated consultation Information Sheets are attached, which provide 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.

As we are inviting consultation with you on each of the EPs above, for ease of reference, we have attached the information in this one email. In an effort to simplify feedback, we have also included a feedback template (Appendix A) which you may wish to use to provide your feedback specific to the proposed EPs.

Woodside has previously submitted Revision 0 of the TPA03 EP to NOPSEMA which has been available on the NOPSEMA website since August 2022 (https://info.nopsema.gov.au/environment_plans/606/show_public).

Woodside is preparing to submit a further revision of the TPA03 EP to NOPSEMA with recent changes. We confirm the location and duration described in these revisions remain the same, with no material changes.

The Julimar EP and revised PLA08 EP have not yet been submitted to NOPSEMA.

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977 by **12 April 2023**.

Activity:

	TPA03 EP	Julimar EP	PLA08 EP

Summary:	Well intervention activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir. The TPA03 production well is a dual zone well connected to the Tidepole manifold and forms part of the subsea production infrastructure for the Goodwyn Alpha Platform. Once the TPA03 well intervention has been completed, the well will be shut-in until production is required. The shut-in and subsequent return to production of the well will be managed under the accepted Goodwyn Alpha (GWA) Facility Operations EP (March 2022).	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	WA-5-L	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
Location:	~138 km north-west of Dampier	~160 km north-west of Dampier	~170 km north-west of Dampier
Approx. Water Depth (m):	~113 m	Operational Area ~ 130-240 m Proposed Julimar South-1 well location ~ 163 m	PLA08: ~820 m

Schedule:	Planned well intervention activities are anticipated to be completed around Q1 2023 – Q3 2023 Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Drilling is currently anticipated in Q3 2023. However, drilling may be performed at any point within three years of EP acceptance. Anchor hold testing will occur prior to this drilling campaign. Geophysical and Geotechnical survey activities are planned to be performed by the end of 2024 but may be performed at any point during the life of the EP (3 years). Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.	Planned drilling, completions, subsea installation and pre-commissioning activities for the proposed PLA08 well are anticipated around Q2 – Q4 2023. Timing of activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.
Duration:	Well intervention activities are expected to take approximately 1-2 weeks to complete.	Drilling, appraisal and suspension activities are currently anticipated to take approximately 40 days to complete. Geophysical and geotechnical survey activities are currently anticipated to take approximately 45 days to complete. Well P&A activities are currently anticipated to take approximately 21 days to complete, if required.	Drilling activities for the proposed PLA08 well are currently expected to take approximately 50 days to complete. Installation of subsea infrastructure and pre-commissioning will commence on completion of drilling and is expected to take up to approximately 30 days. If required, well intervention activities will take up to 70 days per well to complete. Activities may occur intermittently over a two-year period.
Exclusionary / Cautionary Zone:	A 1 km radius Operational Area will be applied around the TPA03 drill centre. A temporary 500 m safety exclusion zone will apply around the HWIV to manage vessel movements.	An approximate 50 km^2 Operational Area will apply during geophysical and geotechnical survey activities. A 4 km radius Operational Area will apply around the JULA-P well whilst the MODU is on location. A 500 m safety exclusion zone will apply around the	A 500 m radius Operational Area will be applied around the dynamically positioned MODU. A 1500 m radius Operational Area will be applied around the PLA08 well location and subsea installation locations (PLA08 to Pluto manifold) whilst activities are taking place. A 4000 m radius Operational Area will apply

		MODU to manage vessel movements.	around a moored MODU, if used. A temporary 500 m petroleum safety exclusion zone will apply during MODU activities.
Vessels:	Well Intervention Vessel (WIV) General supply/support vessels The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	MODU General supply/support vessels Survey / AHT vessel The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.	A dynamically positioned MODU is intended to be used for the drilling activities. The MODU may be supported by subsea installation and light well intervention vessels. Support vessels may be used including, anchor handling vessels and activity support vessels. The vessels will operate on dynamic positioning and will not anchor/moor on the seabed. Vessels will operate 24 hours per day for the duration of the activities.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains confidential to NOPSEMA.

Please provide your views by **12 April 2023**.

Regards

4.37 Email sent to Bundi Yamatji Aboriginal Corporation (BYAC) (17 March 2023)

Dear [redacted]

I hope this email finds you well.

I am contacting you to discuss Woodside's environmental plans in relation to the following activities:

- Stybarrow. This involves two work activities that are subject to separate environment plans; plug and abandonment (P&A) of the wells and decommissioning the infrastructure.
    - consultation-information-sheet---stybarrow-plug-and-abandonment-environment-plan.pdf (woodside.com)
    - Consultation Information Sheet - Stybarrow Decommissioning Environment Plans (woodside.com)
- Griffin decommissioning.
    - consultation-information-sheet---griffin-decommissioning-environment-plans.pdf (woodside.com)
- Julimar Appraisal Drilling.
    - Consultation Information Sheet - Julimar Appraisal Drilling and Survey Environment Plan (woodside.com)

In preparing for this work, 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 identified and will be outlined in each EP. The attached documents provide further information about this work, including a summary of the potential risks and the management measures Woodside plans to implement for this work.

Woodside is seeking to understand the nature of the interests that Bundi Yamatj Aboriginal Corporation (BYAC) and its members may have in relation to these activities by 17 April 2023. If there are other methods of consultation that BYAC would like Woodside to undertake, we would be pleased to work with BYAC to accommodate these.

Please feel free to contact me if you require further information or assistance in relation to this matter. Feedback can be provided directly to me on the details below, to Feedback@woodside.com.au, by calling Woodside's feedback number 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 feel free to forward this email and the attached document to BYAC members as required. Woodside would be pleased to speak with BYAC members in addition to the BYAC Board/office holders.

Kind regards

4.38 Email sent to Kariyarra (24 March 2023)

Good afternoon [redacted]

Just a courtesy follow up to check if you have had the chance to review the emails I've shared on respective activity and if I can assist with any questions you may have.

We welcome the opportunity to provide further detail to you and your board if that is of interest.

Please don't hesitate to contact me if you have any queries.

Kind regards

4.39 Email sent to Carnarvon Chamber of Commerce and Industry (31 March 2023)

Dear Carnarvon Chamber

Woodside previously consulted you (email below) on its plans to undertake geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**) in Commonwealth waters.

If you have feedback specific to the proposed activities described under the proposed EP, please provide your feedback by **9 April 2023**.

Kind regards,

4.40 Email sent to Shire of Carnarvon (31 March 2023)

Dear Shire of Carnarvon

Woodside previously consulted you (email below) on its plans to undertake geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**) in Commonwealth waters.

If you have feedback specific to the proposed activities described under the proposed EP, please provide your feedback by **9 April 2023**.

Kind regards,

4.41 Email sent to Pilbara Line Fishery (9 Licence Holders), Pilbara Trap Fishery (6 Licence Holders) and Pilbara Trawl Fishery (7 Licence Holders) (31 March 2023)

Dear Fishery Stakeholder,

Woodside previously consulted you (email below) on its plans to undertake the following activities in Commonwealth waters:

- Activities on the TPA03 production well to remediate a down-hole valve and continue production from the lower reservoir, under the TPA03 Well Intervention Environment Plan (**TPA03 EP**);
- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- Drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

If you have feedback specific to each of the proposed activities described under the relevant EPs, please respond to Woodside at Feedback@woodside.com.au or 1800 442 977.

Kind regards,

4.42 Letter sent to Abrolhos Islands and Mid West Trawl Managed Fishery (10 Licence Holders) (31 March 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

31 March 2023

Dear Fishery Stakeholder

Woodside previously consulted you (correspondence dated 27 February 2023) on its plans to undertake geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**) in Commonwealth waters.

Activity:

	Julimar EP
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.
Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P
Location:	~160 km north-west of Dampier
QR code	Please see the relevant QR code below which link directly to Consultation Information Sheets which provide 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 www.woodside.com.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is

sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains 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

4.43 Letter sent to Exmouth Gulf Beach Seine and Mesh Net Managed Fishery (6 Licence Holders) (31 March 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

31 March 2023

Dear Fishery Stakeholder

Woodside previously consulted you (correspondence dated 27 February 2023) on its plans to undertake the following activities in Commonwealth waters:

- Geotechnical and geophysical surveys, drilling and appraisal of the Julimar South-1 well (previously called JULA-P) and, plug and abandonment of Julimar South-1, if required, under the Julimar Drilling and Surveys Environment Plan (**Julimar EP**); and
- drilling and subsea infrastructure installation activities for one well (PLA08) and contingent well intervention activities for current production wells, under the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan Revision (**PLA08 EP**).

Activity:

	Julimar EP	**PLA08 EP**
Summary:	One new appraisal-keeper well, Julimar South-1, will be drilled to further understand reservoir properties. Prior to drilling, anchor hold tests will occur around the Julimar South-1 well location. The well will then be drilled, appraisal activities undertaken and then the reservoir section cemented and suspended pending a development decision. Geotechnical and geophysical surveys will be conducted to support Julimar South-1 well activities and future drilling mooring designs. Development of the Julimar South-1 well is subject to future development decisions • If the well is not developed, it will be plugged and abandoned (P&A) under this EP (during the three year period). • If the well is selected for development, completions and end of field life (EOFL) P&A activities would be subject to a future EP.	Drill and develop the proposed PLA08 production well. Contingent activities including well intervention workover or re-drill the Pluto, Pyxis, and Xena production wells (PLA01 to PLA08, PYA01 and PL-PYA02, and XNA01 and XNA02) to monitor and maintain their integrity, if required.
Permit area:	Drilling: WA-49-L Geotechnical and geophysical surveys: Within the WA-49-L title area and neighbouring Chevron operated title areas WA-5-R, WA-76-R and WA-526-P	WA-34-L
QR codes: *Please see the relevant QR codes below which link directly to Consultation Information Sheets which provide 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 www.woodside.com.		

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to these locations, please respond to Woodside at:
Feedback@woodside.com.au or 1800 442 977.

Your feedback and our response will be included in our Environment Plans 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 any of the activities proposed under an Environment Plan is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan to ensure this information remains 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

APPENDIX A

FEEDBACK	**Julimar EP**	**PLA08 EP**

4.44 Email sent to Bundi Yamatji Aboriginal Corporation (BYAC) (30 March 2023)

Good afternoon [redacted]

Thank you for our conversation today. As discussed, Woodside is seeking to consult with Bundi Yamatji Aboriginal Corporation in relation to the proposed activities outlined below. We are seeking to understand whether the Bundi Yamatji Aboriginal Corporation believe they may have interests that may be impacted by the proposed activities or simply wish to understand more, we would appreciate a time to meet to discuss, or we can engage with the Bundi Yamatji Aboriginal Corporation's preferred form of consultation.

Please feel free to call me should you wish to discuss or require further information.

Kind regards

APPENDIX G. DEPARTMENT OF ABORIGINAL AFFAIRS HERITAGE SEARCH RESULTS

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

No Registered Aboriginal Sites in Shapefile - 20221511_J85OperationalArea_New

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

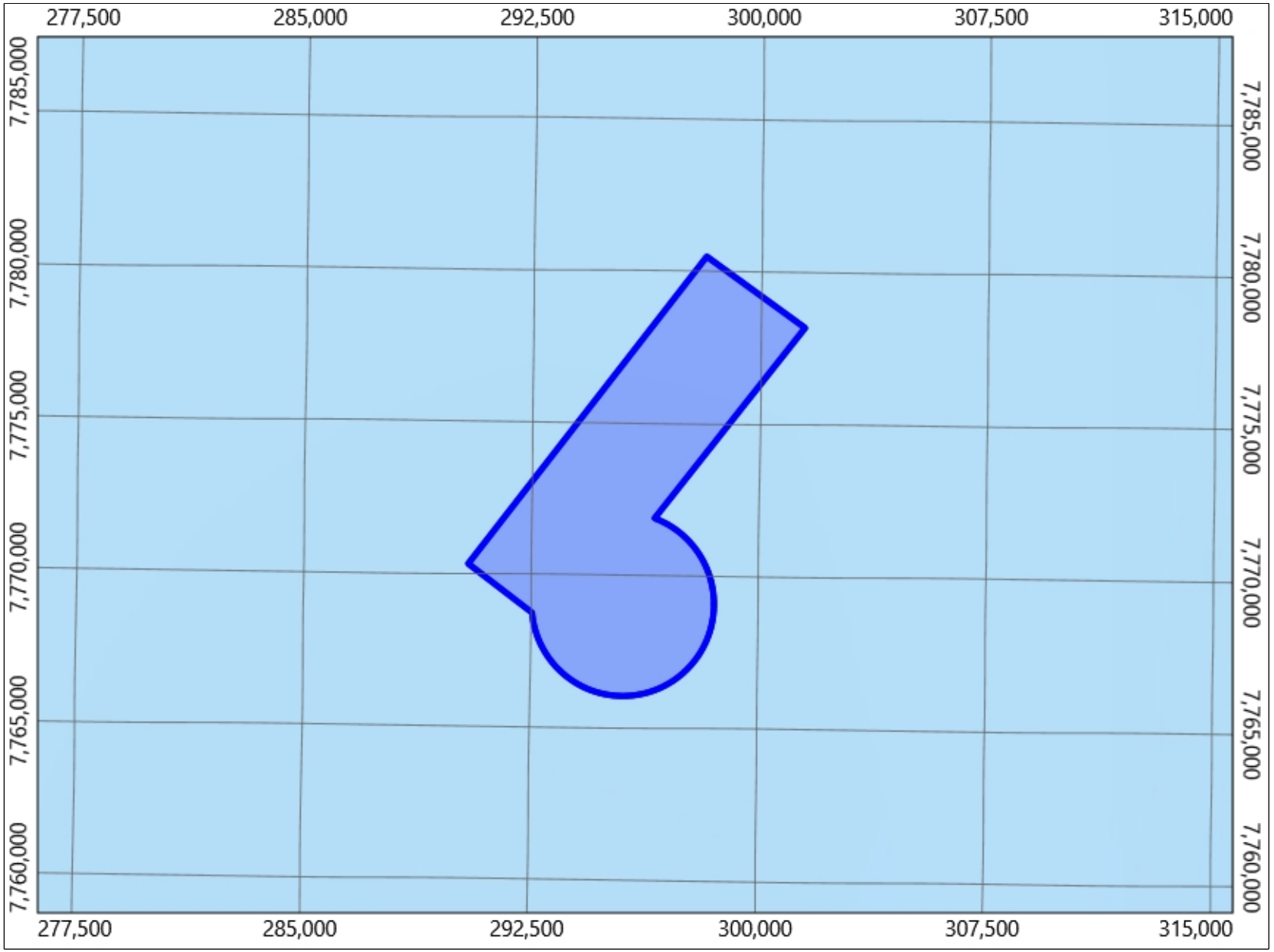
Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Registered Aboriginal Sites

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Registered Aboriginal Site
- Search Area
- Town
- Road
- River
- Local Government Authority

6.70 kilometres

Map Scale 1 : 203,000

MGA Zone 50 (GDA94)

Aboriginal Heritage Inquiry System

List of Other Heritage Places

Search Criteria

No Other Heritage Places in Shapefile - 20221511_J85OperationalArea_New

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

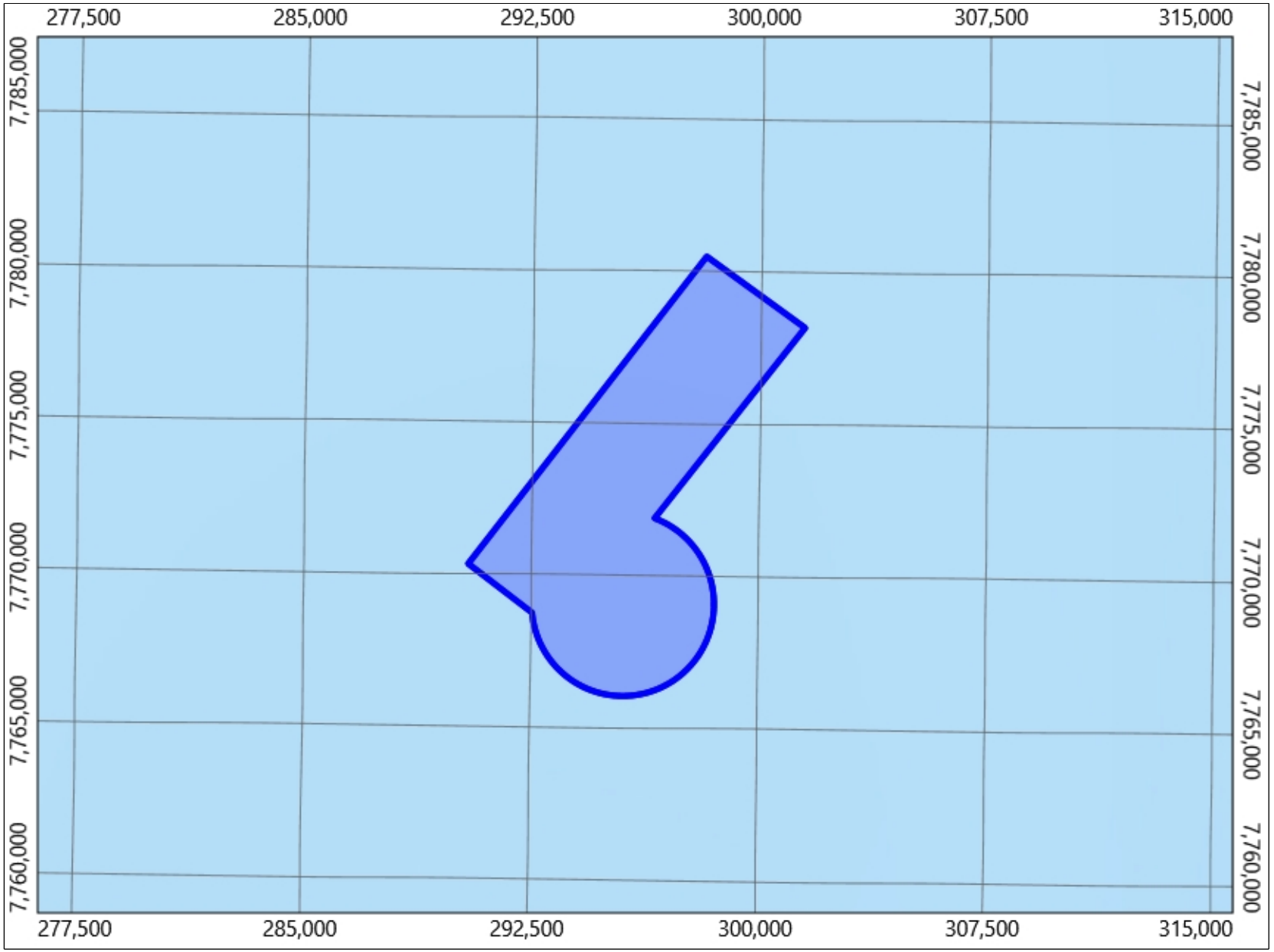
Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Other Heritage Places

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Other Heritage Place
- Search Area
- Town
- Road
- River
- Local Government Authority

6.70 kilometres

Map Scale 1 : 203,000

MGA Zone 50 (GDA94)

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

66 Registered Aboriginal Sites in Shapefile - 20221114_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 4km²) 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.

Basemap Copyright

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
508	POINT MURAT 03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	209042mE 7584688mN Zone 50 [Reliable]	P07503
509	POINT MURAT 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	208690mE 7584604mN Zone 50 [Reliable]	P07504
563	POINT MURAT 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	208716mE 7585665mN Zone 50 [Reliable]	P07501
564	POINT MURAT 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	209079mE 7585539mN Zone 50 [Reliable]	P07502
628	CAMP THIRTEEN BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	800392mE 7559449mN Zone 49 [Reliable]	P07434
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 DPL	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 DPL	348289mE 7741005mN Zone 50 [Reliable]	P07286
6017	YARDIE CREEK CARAVAN BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	191538mE 7576555mN Zone 50 [Unreliable]	P07115
6117	MOWBOWRA POOL.	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves, Camp, Other: ?	*Registered Knowledge Holder names available from DPL	202138mE 7564155mN Zone 50 [Reliable]	P07006
6118	QUALING POOL.	No	No	No Gender Restrictions	Registered Site	Camp, Other: ?	*Registered Knowledge Holder names available from DPL	202138mE 7562155mN Zone 50 [Reliable]	P07007
6311	POINT MURAT.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp, Other: ?	*Registered Knowledge Holder names available from DPL	208538mE 7584405mN Zone 50 [Reliable]	P06628
6754	OSPREY BAY 6	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	792942mE 7538749mN Zone 49 [Reliable]	P06165

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
6755	OSPREY BAY INTERDUNAL 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	792342mE 7537149mN Zone 49 [Unreliable]	P06166
6756	OSPREY BAY INTERDUNAL 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DPL	792642mE 7537149mN Zone 49 [Reliable]	P06167
6757	BLOODWOOD CREEK MIDDEN 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	794942mE 7544549mN Zone 49 [Reliable]	P06168
6758	BLOODWOOD CREEK MIDDEN 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	794942mE 7545049mN Zone 49 [Reliable]	P06169
6759	BLOODWOOD CREEK MIDDEN 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	795142mE 7544949mN Zone 49 [Reliable]	P06170
6760	BLOODWOOD CREEK SHORELINE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	794942mE 7545249mN Zone 49 [Reliable]	P06171
6761	LOW POINT MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	802992mE 7566299mN Zone 49 [Reliable]	P06172
6762	MILYERING MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	801342mE 7561449mN Zone 49 [Reliable]	P06173
6763	YARDIE ROCKSHELTERS NORTH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DPL	791542mE 7530249mN Zone 49 [Unreliable]	P06174
6764	CAMP 17 SOUTH MIDDENS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	799042mE 7555649mN Zone 49 [Unreliable]	P06175
6765	CAMP 17 NORTH MIDDENS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	799042mE 7555849mN Zone 49 [Unreliable]	P06176
6782	28 MILE CREEK NORTH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	795242mE 7545949mN Zone 49 [Unreliable]	P06140

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
6784	MANDU MANDU CREEK SOUTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	796642mE 7548649mN Zone 49 [Unreliable]	P06142
6785	MANDU MANDU CREEK NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	796642mE 7548649mN Zone 49 [Unreliable]	P06143
6787	MANDU MANDU ROCKSHELTERS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, Arch Deposit, Other: ?	*Registered Knowledge Holder names available from DPL	797242mE 7547449mN Zone 49 [Reliable]	P06145
6790	YARDIE CREEK SOUTH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	788942mE 7527749mN Zone 49 [Reliable]	P06148
6791	YARDIE CREEK SOUTH 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	790342mE 7528149mN Zone 49 [Reliable]	P06149
6793	ROAD ALIGNMENT 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	794942mE 7541649mN Zone 49 [Unreliable]	P06151
6794	ROAD ALIGNMENT 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	794942mE 7541449mN Zone 49 [Unreliable]	P06152
6795	ROAD ALIGNMENT 3	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DPL	794842mE 7541249mN Zone 49 [Reliable]	P06153
6797	YARDIE WELL ROCKSHELTER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, Arch Deposit, BP Dating: 10, 490+/-180BP, Other: ?	*Registered Knowledge Holder names available from DPL	791542mE 7530449mN Zone 49 [Reliable]	P06155
6798	YARDIE INTERDUNAL SWALE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	789942mE 7528849mN Zone 49 [Reliable]	P06156
6799	YARDIE BEACH MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	789842mE 7529049mN Zone 49 [Reliable]	P06157
6800	OYSTER STACKS MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	797042mE 7549849mN Zone 49 [Reliable]	P06158

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
6801	NORTH T-BONE BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	801666mE 7562059mN Zone 49 [Reliable]	P06159
6802	OSPREY BAY 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	792742mE 7538149mN Zone 49 [Reliable]	P06160
6803	OSPREY BAY 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	792742mE 7538049mN Zone 49 [Reliable]	P06161
6804	OSPREY BAY 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	792542mE 7537849mN Zone 49 [Reliable]	P06162
6805	OSPREY BAY 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	792342mE 7537049mN Zone 49 [Reliable]	P06163
6806	OSPREY BAY 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	792742mE 7538149mN Zone 49 [Reliable]	P06164
6827	CORAL BAY SKELETON	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	785143mE 7445149mN Zone 49 [Unreliable]	P06132
7126	MESA CAMP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	798442mE 7554749mN Zone 49 [Unreliable]	P05792
7205	TWIN HILL FISHING PLACE.	No	No	No Gender Restrictions	Registered Site	Hunting Place	*Registered Knowledge Holder names available from DPL	787042mE 7467649mN Zone 49 [Unreliable]	P05709
7206	WEALJUGOO MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Hunting Place	*Registered Knowledge Holder names available from DPL	776584mE 7504740mN Zone 49 [Reliable]	P05710
7254	SANDY BAY NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	793442mE 7539949mN Zone 49 [Reliable]	P05652
7265	LAKE SIDE VIEW	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	800942mE 7560549mN Zone 49 [Reliable]	P05664

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
7298	YARDIE CREEK ROCKSHELTERS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	790635mE 7529704mN Zone 49 [Reliable]	P05644
7299	YARDIE CREEK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	789642mE 7528649mN Zone 49 [Unreliable]	P05645
7300	MANDU MANDU CK ROCKSHELTERS	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	P05646
7301	CAMP 17 CREEK EAST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	800342mE 7555749mN Zone 49 [Reliable]	P05647
7303	TULKI WELL MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	798642mE 7554249mN Zone 49 [Reliable]	P05649
7304	PILGRAMUNNA BAY MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	794642mE 7543349mN Zone 49 [Reliable]	P05650
7305	MANGROVE BAY.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Hunting Place	*Registered Knowledge Holder names available from DPL	804142mE 7568149mN Zone 49 [Reliable]	P05651
8301	NINGALOO STATION	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	775891mE 7493649mN Zone 49 [Unreliable]	P04353
10381	VLAMING HEAD	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	P01799
11400	YARDIE CREEK STATION	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DPL	191638mE 7576655mN Zone 50 [Unreliable]	P00750
11401	5 Mile Well (Cape Range)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Painting, Quarry, Arch Deposit	*Registered Knowledge Holder names available from DPL	198638mE 7583655mN Zone 50 [Unreliable]	P00751
11458	NINGALOO (near)	No	No	No Gender Restrictions	Registered Site	Painting	*Registered Knowledge Holder names available from DPL	781642mE 7511649mN Zone 49 [Unreliable]	P00701

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

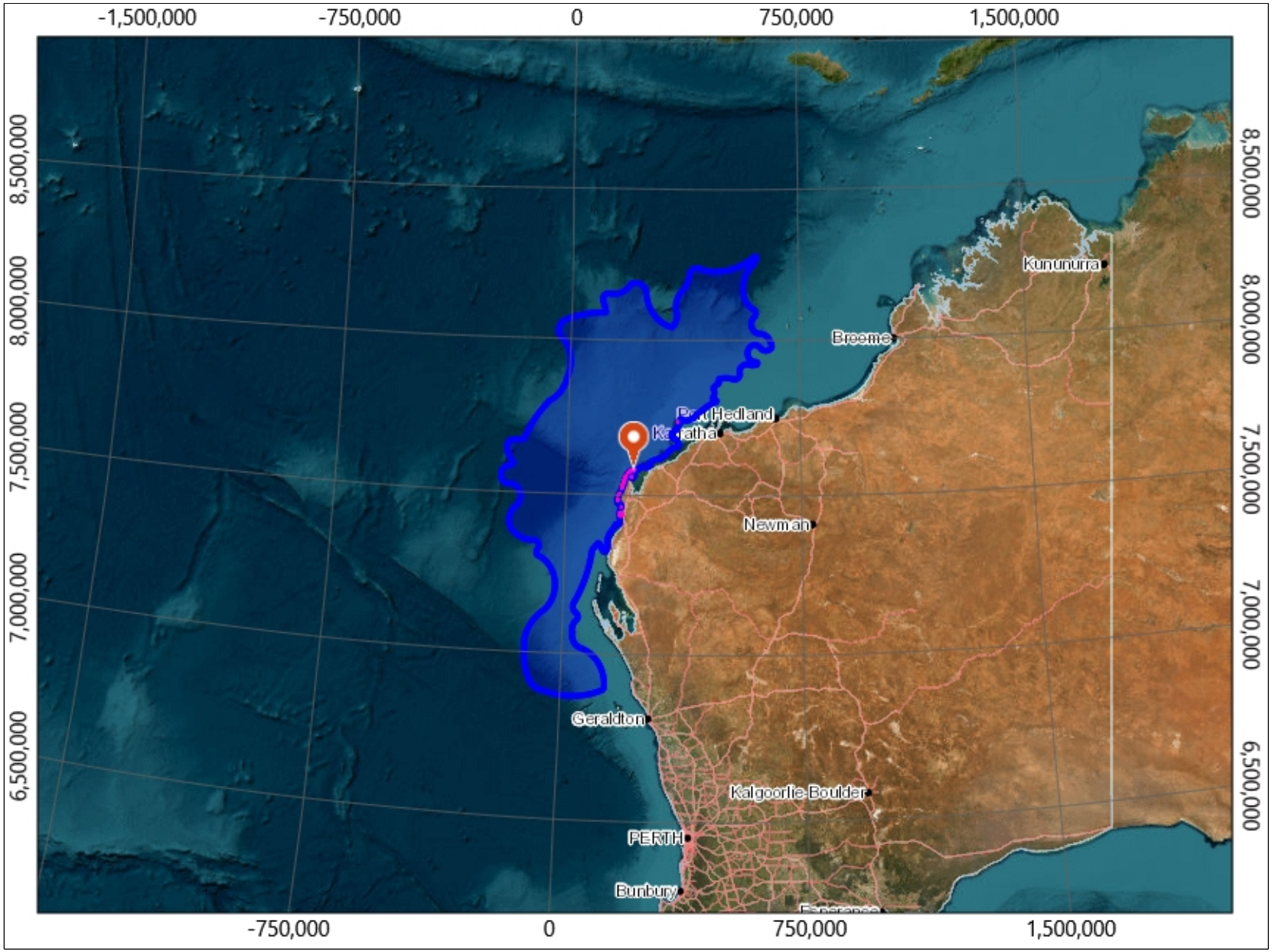
ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
11885	PADJARI MANU CAVE (Formerly Bunbury Cave)	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Engraving, Painting, Arch Deposit, Water Source	*Registered Knowledge Holder names available from DPL	Not available when location is restricted	P00267
15322	POINT MURAT/WHITE OPAL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	209012mE 7585213mN Zone 50 [Reliable]	P07916
17193	Ningaloo Station	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	775891mE 7489149mN Zone 49 [Unreliable]	
17448	CHUGORI ROCKHOLE	No	No	No Gender Restrictions	Registered Site	Ceremonial, Grinding Patches / Grooves, Man-Made Structure, Mythological, Water Source	*Registered Knowledge Holder names available from DPL	193492mE 7579323mN Zone 50 [Reliable]	
38694	Mandu Mandu Creek South Rockshelter 5 (MMCSR5)	No	No		Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Rockshelter	*Registered Knowledge Holder names available from DPL	797118mE 7545777mN Zone 49 [Reliable]	
38695	Mandu Mandu Creek South Rockshelter 8 (MMCSR8)	No	No		Registered Site	Artefacts / Scatter, Rockshelter	*Registered Knowledge Holder names available from DPL	796803mE 7546076mN Zone 49 [Reliable]	

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Registered Aboriginal Sites

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Registered Aboriginal Site
- Search Area
- Town
- Road
- River
- Local Government Authority

659.59 kilometres

Map Scale 1 : 19,990,000

MGA Zone 50 (GDA94)

Aboriginal Heritage Inquiry System

List of Other Heritage Places

Search Criteria

33 Other Heritage Places in Shapefile - 20221114_EMBA

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 4km²) 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.

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
599	NORWEGIAN BAY 2 #Duplicate of ID 7037	No	No	No Gender Restrictions	Stored Data / Not a Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Other: 11462 is also a duplicate of this site.	*Registered Knowledge Holder names available from DPL	773421mE 7500769mN Zone 49 [Reliable]	P07441
885	BARROW ISLAND 03	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	326224mE 7689495mN Zone 50 [Reliable]	P07293
886	BARROW ISLAND 04	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	325227mE 7694610mN Zone 50 [Reliable]	P07294
887	BARROW ISLAND 05	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	337603mE 7713680mN Zone 50 [Reliable]	P07295
888	BARROW ISLAND 06 A-F	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	337202mE 7710824mN Zone 50 [Unreliable]	P07296
890	BARROW ISLAND 08	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	326487mE 7695727mN Zone 50 [Reliable]	P07298
891	BARROW ISLAND 09	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	326270mE 7691185mN Zone 50 [Reliable]	P07299
893	BARROW ISLAND 11	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	326145mE 7695108mN Zone 50 [Reliable]	P07301
894	BARROW ISLAND 12	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	326347mE 7699332mN Zone 50 [Reliable]	P07302
6119	PAP HILL 1.	No	No	No Gender Restrictions	Lodged	Rockshelter	*Registered Knowledge Holder names available from DPL	198238mE 7581955mN Zone 50 [Reliable]	P07008
6120	PAP HILL 2.	No	No	No Gender Restrictions	Lodged	Grinding Patches / Grooves, Rockshelter, BP Dating: 35,230 BP	*Registered Knowledge Holder names available from DPL	198138mE 7581855mN Zone 50 [Reliable]	P07009
6783	28 MILE CREEK NORTH 2	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	795452mE 7546377mN Zone 49 [Reliable]	P06141

Aboriginal Heritage Inquiry System

List of Other Heritage Places

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
6786	LAKESIDE COASTAL PLAIN	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	801642mE 7560649mN Zone 49 [Unreliable]	P06144
6789	TURQUOISE BAY NORTH	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	798642mE 7554649mN Zone 49 [Unreliable]	P06147
6796	ROAD ALIGNMENT 4	No	No	No Gender Restrictions	Stored Data / Not a Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	792442mE 7533369mN Zone 49 [Reliable]	P06154
7207	NORWEGIAN BAY MIDDEN	No	No	No Gender Restrictions	Lodged	Midden / Scatter	*Registered Knowledge Holder names available from DPL	775641mE 7498949mN Zone 49 [Reliable]	P05711
7208	MILYERING ROCKS.	No	No	No Gender Restrictions	Lodged	Hunting Place	*Registered Knowledge Holder names available from DPL	800842mE 7560649mN Zone 49 [Reliable]	P05712
7302	CAMP 17 CREEK ROCKSHELTERS	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	800042mE 7555249mN Zone 49 [Unreliable]	P05648
8946	YARDIE CREEK	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	790842mE 7527849mN Zone 49 [Reliable]	P03537
8951	BARROW ISLAND	No	No	No Gender Restrictions	Stored Data / Not a Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	335137mE 7705156mN Zone 50 [Unreliable]	P03542
11403	THEVENARD ISLAND	No	No	No Gender Restrictions	Stored Data / Not a Site	Midden / Scatter	*Registered Knowledge Holder names available from DPL	292638mE 7625655mN Zone 50 [Unreliable]	P00753
11801	COASTAL MIDDEN, 5 MILE	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	195638mE 7582655mN Zone 50 [Unreliable]	P00345
16595	Jarvis Well Camp	No	No	No Gender Restrictions	Stored Data / Not a Site	Artefacts / Scatter, Historical	*Registered Knowledge Holder names available from DPL	776491mE 7498549mN Zone 49 [Reliable]	
19838	Midden Site at Exmouth River mouth	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPL	203751mE 7567075mN Zone 50 [Reliable]	

Aboriginal Heritage Inquiry System

List of Other Heritage Places

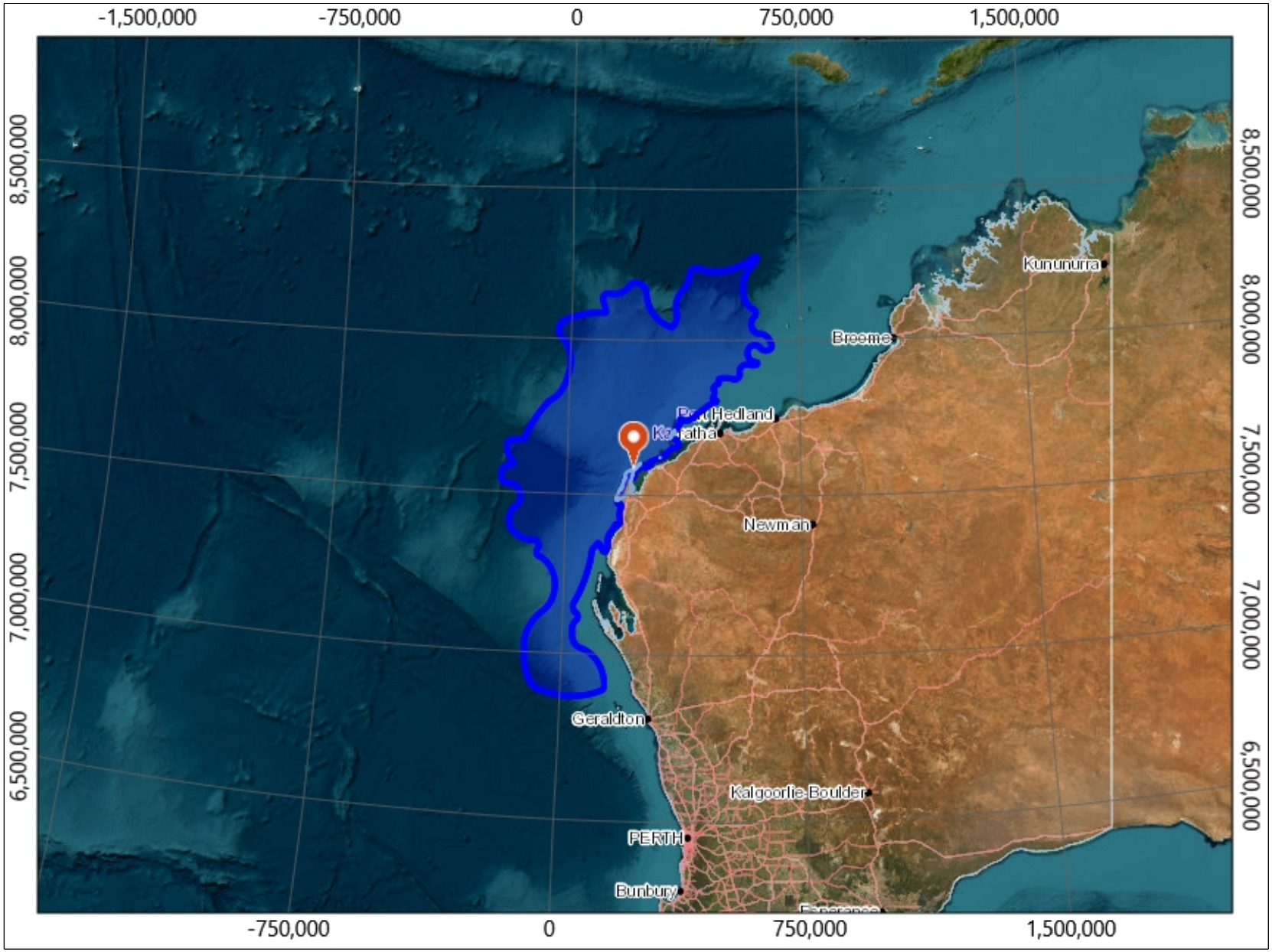
ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
21468	Sandy Point Rockshelter	No	No	No Gender Restrictions	Lodged	Man-Made Structure, Rockshelter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DPL	786694mE 7521436mN Zone 49 [Reliable]	
25076	Norwegian Bay Burial 01/2008	No	No	No Gender Restrictions	Lodged	Skeletal Material / Burial	*Registered Knowledge Holder names available from DPL	774175mE 7499790mN Zone 49 [Reliable]	
36199	Boodie Cave	No	No		Lodged	Artefacts / Scatter, Rockshelter	*Registered Knowledge Holder names available from DPL	329709mE 7703887mN Zone 50 [Reliable]	
36234	South End structures, Barrow Island.	No	No		Lodged	Historical, Man-Made Structure	*Registered Knowledge Holder names available from DPL	326057mE 7689365mN Zone 50 [Unreliable]	
36261	G-13-S0001	No	No		Lodged	Quarry	*Registered Knowledge Holder names available from DPL	329032mE 7702259mN Zone 50 [Reliable]	
36270	M-03-S0001	No	No		Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	335996mE 7712066mN Zone 50 [Reliable]	
36271	N-02-S0001	No	No		Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	336855mE 7713004mN Zone 50 [Reliable]	
36272	O-02-S0002	No	No		Lodged	Artefacts / Scatter	*Registered Knowledge Holder names available from DPL	337100mE 7713272mN 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 DPL	804815mE 7536655mN Zone 49 [Reliable]	

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Other Heritage Places

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Other Heritage Place
- Search Area
- Town
- Road
- River
- Local Government Authority

659.59 kilometres

Map Scale 1 : 19,990,000

MGA Zone 50 (GDA94)

APPENDIX H. OIL POLLUTION FIRST STRIKE PLAN

Julimar Appraisal Drilling and Surveys – Oil Pollution First Strike Plan

Corporate HSE

Hydrocarbon Spill Preparedness

April 2023
Revision 0

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) Duty Manager
	State waters	1	Woodside	CIMT Duty Manager
		2/3	Department of Transport (DoT)	DoT Incident Controller
	Within port limits	1	Woodside	CIMT Duty Manager
		2/3	DoT	DoT Incident Controller
Spill from vessel Note: Shipboard Oil Pollution Emergency Plan (SOPEP) should be implemented in conjunction with this document	Commonwealth waters	1	Australian Marine Safety Authority (AMSA)	Vessel Master (with response assistance from Woodside)
		2/3	AMSA	AMSA (with response assistance from Woodside)
	State waters	1	DoT	DoT Incident Controller
		2/3	DoT	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 Incident Management Team (IMT) (APPENDIX F – Woodside Liaison Officer Resources to DoT). DoT's role as the Controlling Agency in State waters limits 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 on **Table 2-1** taking into consideration seasonal sensitivities and current situational awareness. Commence validated strategies.	If requested by AMSA: Commence quick revalidation of the recommended strategies on **Table 2-1** taking into consideration seasonal sensitivities and current situational awareness. Commence validated strategies.
Create an Incident Action Plan (IAP) for all ongoing operational periods The content of the IAP should reflect the selected response strategies based on current situational awareness. For the full detailed pre-operational Net Environmental Benefit Analysis (NEBA) see the OSPRMA Appendix A	If requested by AMSA: Create an IAP for all ongoing operational periods The content of the IAP should reflect the selected response strategies based on current situational awareness. For the full detailed pre-operational NEBA see the OSPRMA Appendix A

1. NOTIFICATIONS

The Incident Controller or delegate must ensure the below notifications (**Table 1-1**) are completed within the designated timeframes.

For spills from a vessel, relevant notifications must be undertaken by a WEL representative.

Table 1-1: Notifications

In the event of an incident between campaign vessels, also activate relevant vessel Emergency Response Plans and/or Bridging Documents							
Timing	**By**	**To**	**Name**	**Contact**	**Instruction**	**Form**	**Complete? (✓)**
NOTIFICATIONS FOR ALL LEVELS OF SPILL							
Immediately	Offshore Installation Manager (OIM) or Vessel Master	Woodside Communication Centre (WCC)	Duty Manager	[redacted]	Verbally notify WCC of event and estimated volume and hydrocarbon type.	Verbal	
Within 2 hours	Woodside Site Rep (WSR), Corporate Incident Management Team Duty Manager (CIMT DM) or Delegate	National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA[1])	Incident notification office	[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 DMIRS).	[redacted]	
Within 3 days	WSR, CIMT DM or Delegate				Provide a written NOPSEMA Incident Report Form as soon as practicable (no later than 3 days after notification) (cc to NOPTA and DMIRS) NOPSEMA [redacted] NOPTA [redacted] DMIRS [redacted]	[redacted]	
As soon as practicable	CIMT DM or Delegate	Woodside	Environment Duty Manager	As per roster	Verbally notify Duty Environment of event and seek advice on relevant performance standards from EP	Verbal	
Within 2 hours of becoming aware of a marine pollution incident (MOP) that occurs in or may impact state waters	CIMT DM or Delegate	WA Department of Transport	DoT Maritime Environmental Emergency Response Unit (MEER) Duty Officer	[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 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 DM 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 DM 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 and organisations	To be determined	To be determined	Should it be identified additional persons such as, but not limited to, commercial fishers, tourism operators or relevant cultural authorities may be affected, Woodside would, at the relevant time, engage with these parties as appropriate in alignment with the Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA) for Julimar Appraisal Drilling and Surveys. Relevant persons and organisations 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 DM or Delegate	Australian Marine Oil Spill Centre (AMOSC)	AMOSC Duty Manager	[redacted]	Notify AMOSC a spill has occurred and follow-up with an email from the **CIMT Leader/ CIMT Deputy Leader/ IMT IC/ CMT Adviser/ 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 DM 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 DM 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
	Vessel (MDO)	LOWC (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:** Tracking buoy deployed within 2 hours.	Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk (OM02) of The Operational Monitoring Operational Plan. Deploy tracking buoy in accordance with [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.**	Intelligence 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). [redacted] *Planning to download immediately and follow steps*
	Yes	Yes	**ALL**	Send Oil Spill Trajectory Modelling (OSTM) form (Appendix B, Form 7) to RPS Response ([redacted]).	Intelligence	**DAY 1:** Detailed modelling within 4 hours of RPS Response receiving information from Woodside.	
Operational monitoring – aerial surveillance (OM02)	Yes	Yes	**ALL**	Instruct Aviation Duty Manager to commence aerial observations in daylight hours. Aerial surveillance observer to complete log in Appendix B Form 8.	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). [redacted] *Planning to download immediately and follow steps*
Operational monitoring – satellite tracking (OM02)	Yes	Yes	**ALL**	The Intelligence duty manager should be instructed to stand up Kongsberg Satellite Services (KSAT) to provide satellite imagery of the spill ([redacted]).	Intelligence	**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:** Service provider 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. 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). [redacted] *Planning to download immediately and follow steps*
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	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	Pre-emptive Assessment of Sensitive Receptors (OM04 of The Operational Monitoring Operational Plan). [redacted] *Planning to download immediately and follow steps*
Operational monitoring –	Yes	Yes	**ALL**	Consider the need to mobilise resources to undertake shoreline assessment surveys (OM05).	Planning or Environment	10 days prior to any impact predicted by OM01/02/03, and in agreement with WA	Shoreline Assessment (OM05 of The Operational Monitoring Operational Plan). [redacted]

Technique	Spill type		Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	Vessel (MDO)	LOWC (Cond.)					
shoreline assessment (OM05)						DoT (for Level 2/3 incidents), deployment of 1 specialist in SCAT for each RPA	*Planning to download immediately and follow steps*
Surface dispersant	**No**	**No**	**N/A**	The modelling undertaken predicts that a spill of Julimar Condensate (JULA-04) might be prone to rapid spreading and evaporation and will not reach the minimum threshold (>50 g/m^2) required for feasible dispersant application for the duration of the spill. Dispersant is not an appropriate response technique for spills of MDO. The application of dispersant is thus deemed inappropriate as it would not provide a net environmental benefit.			
Containment and recovery	**No**	**No**	**N/A**	The modelling undertaken predicts a spill of Julimar Condensate (JULA-04) might be prone to rapid spreading and evaporation and will not reach the minimum threshold (>50 g/m^2) required for feasible containment and recovery for the duration of the spill. Corralling volatile substances such as Julimar Condensate or MDO also poses a safety risk and thus should be avoided. This response technique is therefore 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**	**Yes**	**ALL**	Shoreline protection and deflection may be deployed in agreement with WA DoT (Level 2/3 spills) if Operational Monitoring activities predict shoreline contact. Woodside will mobilise and commence shoreline protection and deflection tactics to reduce the volume of oil accumulating on shorelines at selected RPAs 5 days prior to predicted impacts. Equipment and relevant personnel from Woodside, AMOSC and AMSA stockpiles to be mobilised. Consideration to be given to the requirement for interstate and international shoreline protection equipment and relevant personnel (e.g. OSRL stockpiles). Mobilise security provider as per security support plan.	**Logistics and Planning**	In agreement with WA DoT, activate relevant Tactical Response Plans (TRPs) 5 days prior to impact. In agreement with WA DoT, mobilise teams to RPAs 5 days prior to impact. In agreement with WA DoT, equipment mobilised from closest stockpile 5 days prior to impact. Supplementary equipment mobilised from AMOSC, AMSA and/or OSRL stockpiles 5 days prior to impact.	Protection and Deflection Operational Plan [redacted] *Logistics to download immediately and follow steps*
Shoreline clean-up	**No**	**Potentially**	**ALL**	Shoreline clean-up operations may be deployed in agreement with WA DoT (Level 2/3 spills) if Operational Monitoring activities predict shoreline contact. Equipment and relevant personnel from Woodside, AMOSC and AMSA stockpiles to be mobilised. Consideration to be given to the requirement for interstate and	**Logistics and Planning**	In agreement with WA DoT, activate relevant Tactical Response Plans (TRPs) 5 days prior to impact. In agreement with WA DoT, mobilise teams to RPAs 5 days prior to impact.	Shoreline Clean-up Operational Plan [redacted] *Logistics to download immediately and follow steps*

Technique	Spill type		Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	Vessel (MDO)	LOWC (Cond.)					
				international shoreline protection equipment and relevant personnel (e.g. OSRL stockpiles). Mobilise security provider as per security support plan.		In agreement with WA DoT, equipment mobilised from closest stockpile 5 days prior to impact. Supplementary equipment mobilised from AMOSC, AMSA and/or OSRL stockpiles 5 days prior to impact.	
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 [redacted]
Scientific monitoring (type II)	Yes	Yes	**ALL**	Notify Woodside science team of spill event.			Oil Spill Scientific Monitoring Programme – Operational Plan [redacted]
SOURCE CONTROL TECHNIQUES							
Subsea First Response Toolkit	N/A	Yes	**L2/3**	Debris clearance equipment may require mobilisation prior to the undertaking of any further source control activities or Subsea Dispersant Injection. Source control via ROV intervention using the intervention riser system (IRS) or subsea tree may be feasible.	Operations and Logistics	**DAY 2:** Remotely Operated Vehicle (ROV) on Mobile Offshore Drilling Unit (MODU) ready for deployment within 48 hours subject to risk assessment and approvals, to undertake inspection and/or well intervention. ROV equipment deployed within 7 days. Intervention vessel with minimum requirement of a working class ROV and operator mobilised to with for deployment within 11 days.	Source Control Emergency Response Planning Guideline Activity Source Control Emergency Response Plan (SCERP)
Subsea Dispersant	N/A	No	N/A	This response strategy is not recommended.			
Capping Stack	N/A	Yes	**L2/3**	Conventional/vertical capping stack deployment with a heavy lift vessel may be attempted if plume radius is ~25 m and environmental conditions permit (wind speed, wave height, and current).	Operations – Source Control Unit	**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	**L2/3**	As per Activity SCERP	Operations – Source Control Unit	**DAY 1:** Identify source control vessel availability within 24 hours. MODU mobilised to location within 21 days.	

3. RESPONSE PROTECTION AREAS

Action: Provide relevant Control Agency with applicable Tactical Response Plans for any Response Protection Areas (RPAs) identified during operational monitoring.

Based on hydrocarbon spill modelling results for both Credible Scenario-01 (CS-01) and CS-02, no receptors have the potential to accumulate shoreline hydrocarbons at or above feasible response threshold levels (≥100 g/m^2) for the duration of a spill.

Hydrocarbon spill modelling results indicate the sensitive receptors listed below have the potential to accumulate shoreline hydrocarbons below feasible response thresholds (≥10 g/m^2) beyond 48 hours of a LOWC spill event (CS-01):

- Barrow Island (5 m^3, 7.3 days)
- Boodie Island, Double Island, and Middle Islands Nature Reserve (3 m^3, 7.6 days)
- Hermite Island, and Montebello Islands and Marine Park (6 m^3, 12.6 days)
- Lowendal Islands (2 m^3, 19.4 days)
- Middle Pilbara – Islands and Shoreline, Muiron Islands and MMA, Passage Islands, and North Sandy Island Nature Reserve (2 m^3, 26 days)
- Southern Pilbara – Islands, and Airlie Island (2 m^3, 30 days)
- Lowendal Islands (2 m^3, 26 days)
- Exmouth, Ningaloo Coast World Heritage Area and State Marine Park, and Cape Range (7 m^3, 35.6 days)

WA Coastline 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 Julimar Appraisal Drilling and Surveys Operational Area and identifies priority protection areas.

Consideration should be given to other persons/organisations (including mariners) in the vicinity of the spill location. **Table 3-1** indicates the assets within the vicinity of the Julimar Appraisal Drilling and Surveys Operational Area.

Table 3-1: Assets in the vicinity of the Julimar Appraisal Drilling and Surveys Operational Area

Asset	Distance and Direction from Operational Area	Operator
Pluto Platform	~30 km east north-east	Woodside
Wheatstone Platform	~33 km north-east	Chevron
John Brookes	~27 km south	Quadrant Energy
East Spar	~55 km south	Quadrant Energy
Goodwyn	~88 km north-east	Woodside
North Rankin (operated by Woodside)	~110 km north-east	Woodside

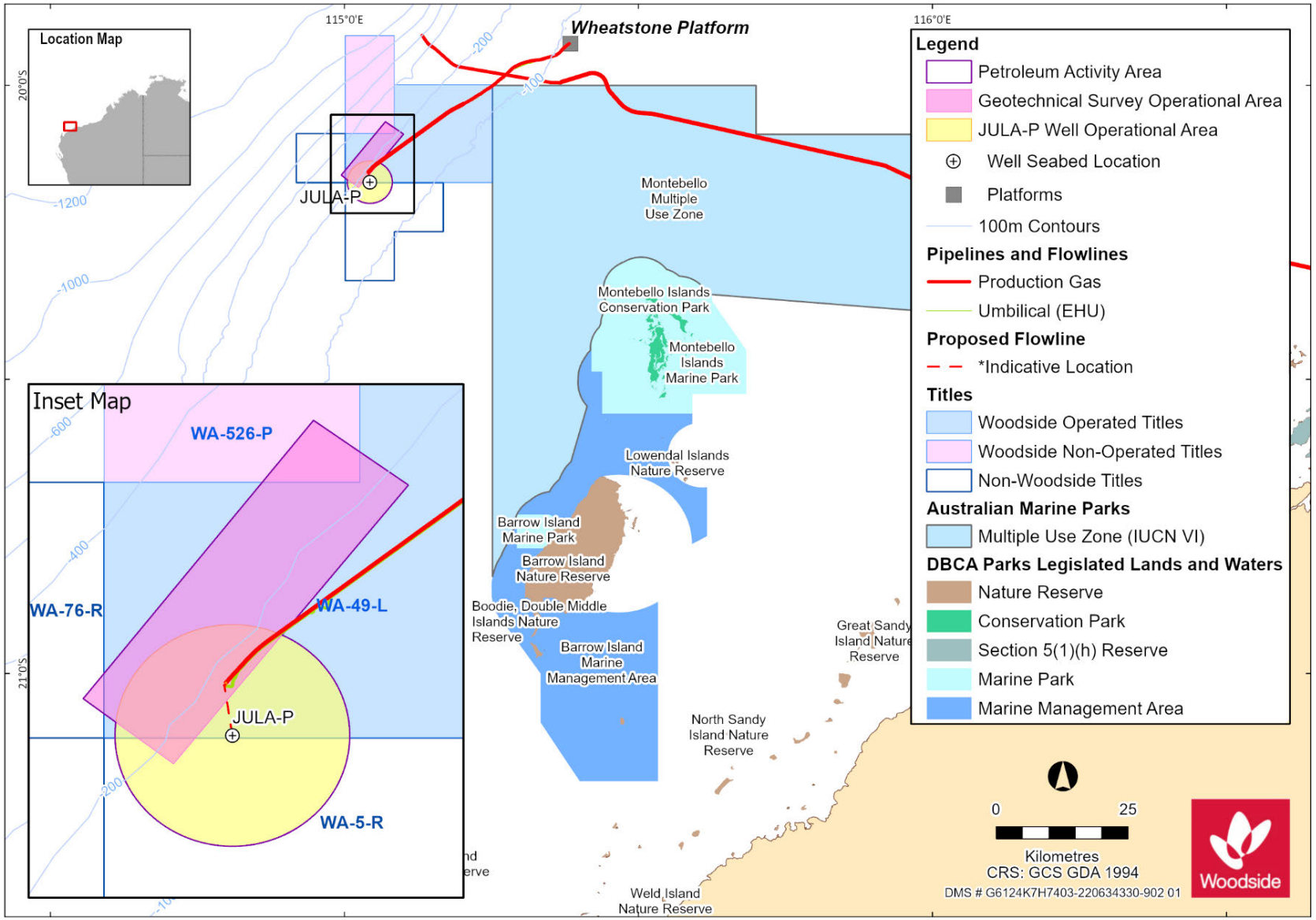


Figure 3-1: Regional sensitive receptors

4. DISPERSANT APPLICATION

Surface dispersant is not considered an appropriate response strategy for this activity as described in the Julimar Appraisal Drilling and Surveys 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	API gravity	Volume	Residue	Weathering rate		Suggested ADIOS2 Analogue[2]
CS-01 (WCCS) **77-Day[3] Subsurface Blowout of Julimar Condensate at the Julimar South-1 (JS-1) Well**	Julimar condensate (JULA-04)	45.7°	54,520 m^3	6.5% or 5,915 m^3	12 hours (BP < 180 °C)	48.8%	Cooper Basin (AD01631), API of 45.2°
					24 hours (180 °C < BP < 265 °C)	21.3%	
					Several days (265 °C < BP < 380 °C)	29.5%	
CS-02 **Vessel collision resulting in rupture of a tank at the wellhead**	MDO	37.2°	2000 m^3 [4]	5% or 100 m^3	12 hours (BP < 180 °C)	6.0%	Diesel Fuel Oil (Southern USA 1). API of 37.2°
					24 hours (180 °C < BP < 265 °C)	34.6%	
					Several days (265 °C < BP < 380 °C)	54.4%	
CS-03 **Loss of containment during bunkering**	MDO	37.2°	24 m^3	5% or 1.2 m^3	12 hours (BP < 180 °C)	6.0%	Diesel Fuel Oil (Southern USA 1). API of 37.2°
					24 hours (180 °C < BP < 265 °C)	34.6%	
					Several days (265 °C < BP < 380 °C)	54.4%	

[2] Initial screening of possible ADIOS2 analogues considered hydrocarbons with similar APIs. Suggested selection is based on the closest distillation cut to the Woodside hydrocarbon. Only hydrocarbons with >380°C distillation cuts were included in selection process.

[3] 77 days was the approximation upon which the credible spill assessment was performed. Subsequent calculations, during WOMP preparation, has reduced this to 61 days. Therefore, 61 days has been applied to the performance standards in the related Julimar Appraisal Drilling and Surveys Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA) and Table 2-1 of this document, and utilised in the preparation of well construction WOMP and activity SCERP.

[4] Loss of marine vessel separation MDO modelling of 2000 m^3 was available close to the JULA-K well location, 2 km from JS-1 well and within the same title (WA-5-L). It was originally undertaken in 2019 and reprocessed later in 2019 using NOPSEMA's contemporary modelling thresholds. The largest tank of the vessel proposed for the JS-1 Well Intervention activity is also 2000 m^3. Given that spill parameters and geographic location fall within the envelope of the existing MDO modelling, it is an appropriate surrogate and therefore additional modelling was not required.

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]

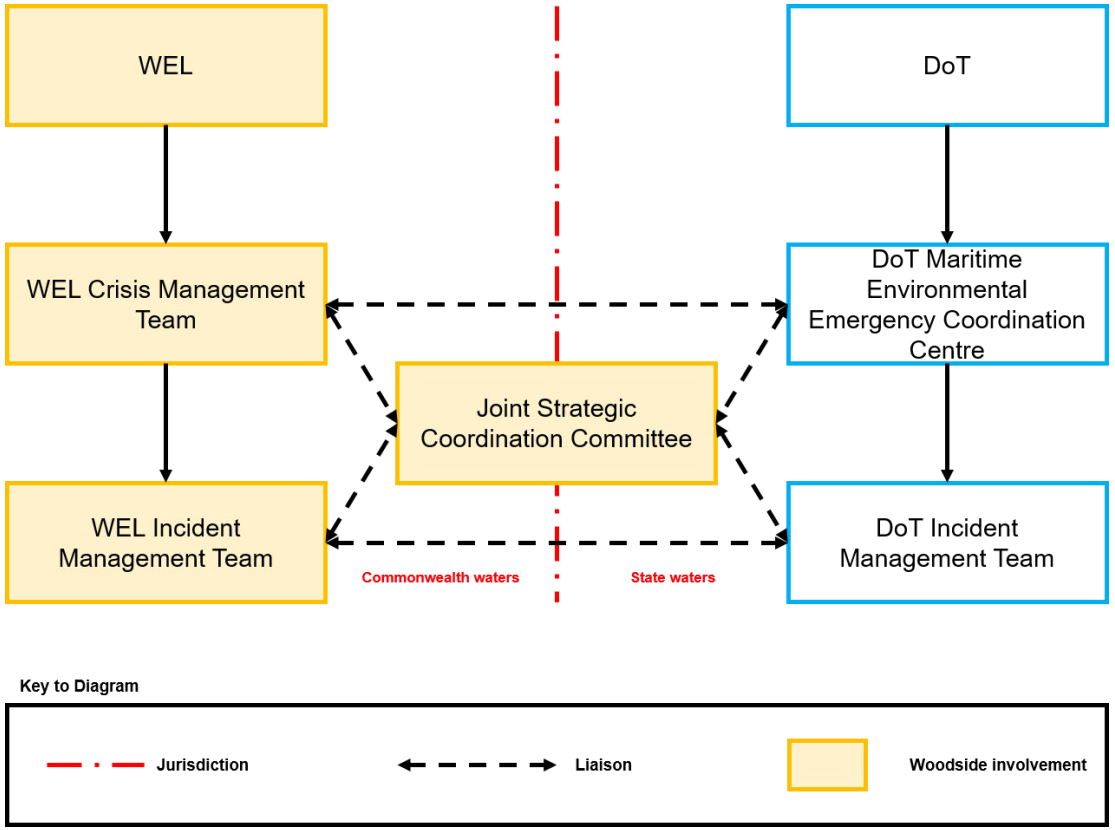
FORM 1 – RECORD OF INITIAL VERBAL NOTIFICATION TO NOPSEMA

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]	
DMIRS	[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[5]



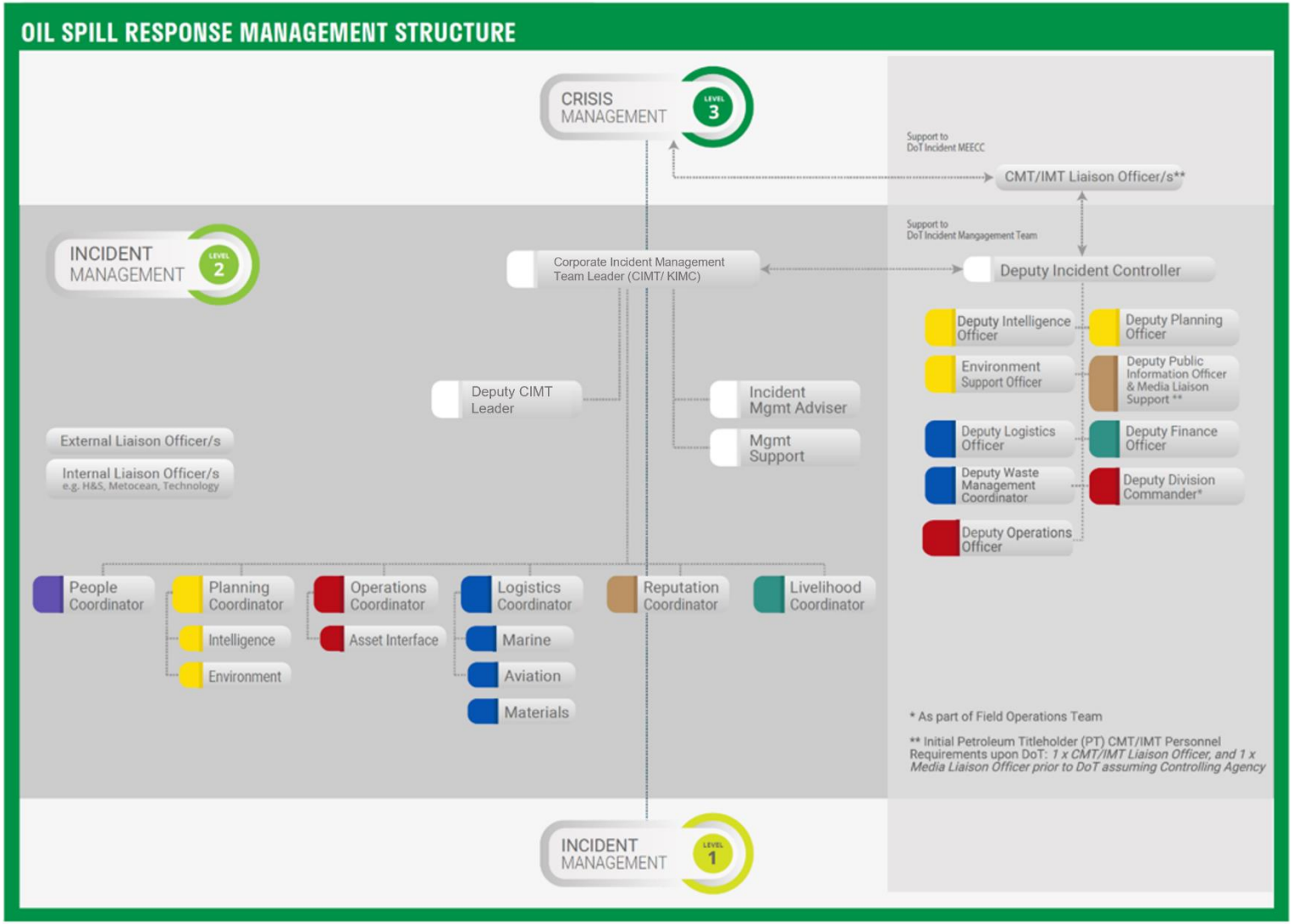
The Control Agency for a hydrocarbon spill in Commonwealth waters resulting from an offshore petroleum activity is Woodside (the Petroleum Titleholder).

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.

[5] 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 DoT is required to establish an IMT, Woodside will make available an appropriate number of appropriately qualified persons to work within the DoT IMT.

It is an expectation 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 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 they arrive at the FOB no later than 24 hours from the formal request being made by the SMPC.

Area	WEL Liaison Role	Personnel Sourced from[6]:	Key Duties	#
DoT Maritime Environmental Emergency Coordination Centre (MEECC)	CMT Liaison Officer	CIMT Leader Roster	• Provide a direct liaison between the CMT and the MEECC. • Facilitate effective communications and coordination between the CMT 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	WEL Deputy Incident Controller	CIMT Leader Roster	• 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	Intelligence Support Officer/ Deputy Intelligence Officer	Intelligence Coordinator Roster	• As part of the Intelligence Team, assist the Intelligence Officer in the performance of their duties in relation to situation and awareness. • Facilitate the provision of relevant modelling and predications from the PT IMT. • Assist in the interpretation of modelling and predictions originating from the PT IMT. • Facilitate the provision of relevant situation and awareness information originating from the DoT IMT to the PT IMT. • Facilitate the provision of relevant mapping from the PT IMT.	1

[6] *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/ KIMC roster arrangements, contact the WCC. During a prolonged response, additional personnel may be sourced through AMOSC Core Group via* [redacted]

Area	WEL Liaison Role	Personnel Sourced from[6]:	Key Duties	#
			• 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	Environment Coordinator Roster	• 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	Planning Coordinator Roster	• 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	Public Information Support and Media Liaison Officer/ Deputy Public Information Officer	Reputation Coordinator Roster	• As part of the Public Information Team, provide a direct liaison between the PT Media team and DoT IMT Media team. • Facilitate effective communications and coordination between the PT and DoT media teams. • Assist in the release of joint media statements and conduct of joint media briefings. • Assist in the release of joint information and warnings through the DoT Information and Warnings team. • Offer advice to the DoT Media Coordinator on matters pertaining to PT media policies and procedures.	1

Area	WEL Liaison Role	Personnel Sourced from[6]:	Key Duties	#
			• 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	Logistics Coordinator Roster	• 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	Livelihood Coordinator Roster	• 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	Operations Coordinator Roster	• As part of the Operations Team, assist the Operations Officer in the performance of their duties in relation to the implementation and management of operational activities undertaken to resolve an incident. • Facilitate effective communications and coordination between the PT Operations Section and the DoT Operations Section. • Offer advice to the DoT Operations Officer on matters pertaining to PT incident response procedures and requirements. • Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of PT and DoT response efforts.	1

Area	WEL Liaison Role	Personnel Sourced from[6]:	Key Duties	#
DoT IMT Operations – Waste Management	Facilities Support Officer/ Deputy Waste Management Coordinator	Logistics Materials Coordinator Roster	• 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 On-Scene Commander/ Deputy Division Commander	CIMT Leader Roster	• 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 Woodside personnel initially required in DoT IMT	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	#
WEL CMT	DoT Liaison Officer (prior to DoT assuming Controlling Agency)/ Deputy Incident Controller – State waters (after DoT assumes Controlling Agency)	DoT	• Facilitate effective communications between DoT's SMPC/ Incident Controller and the Petroleum Titleholder's appointed CMT Leader / Incident Controller. • Provide enhanced situational awareness to DoT of the incident and the potential impact on State waters. • Assist in the provision of support from DoT to the Petroleum Titleholder. • Facilitate the provision technical advice from DoT to the Petroleum Titleholder Incident Controller as required.	1
WEL Reputation FST (Media Room)/ 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. MASTER EXISTING ENVIRONMENT

Description of the Existing Environment

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

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.

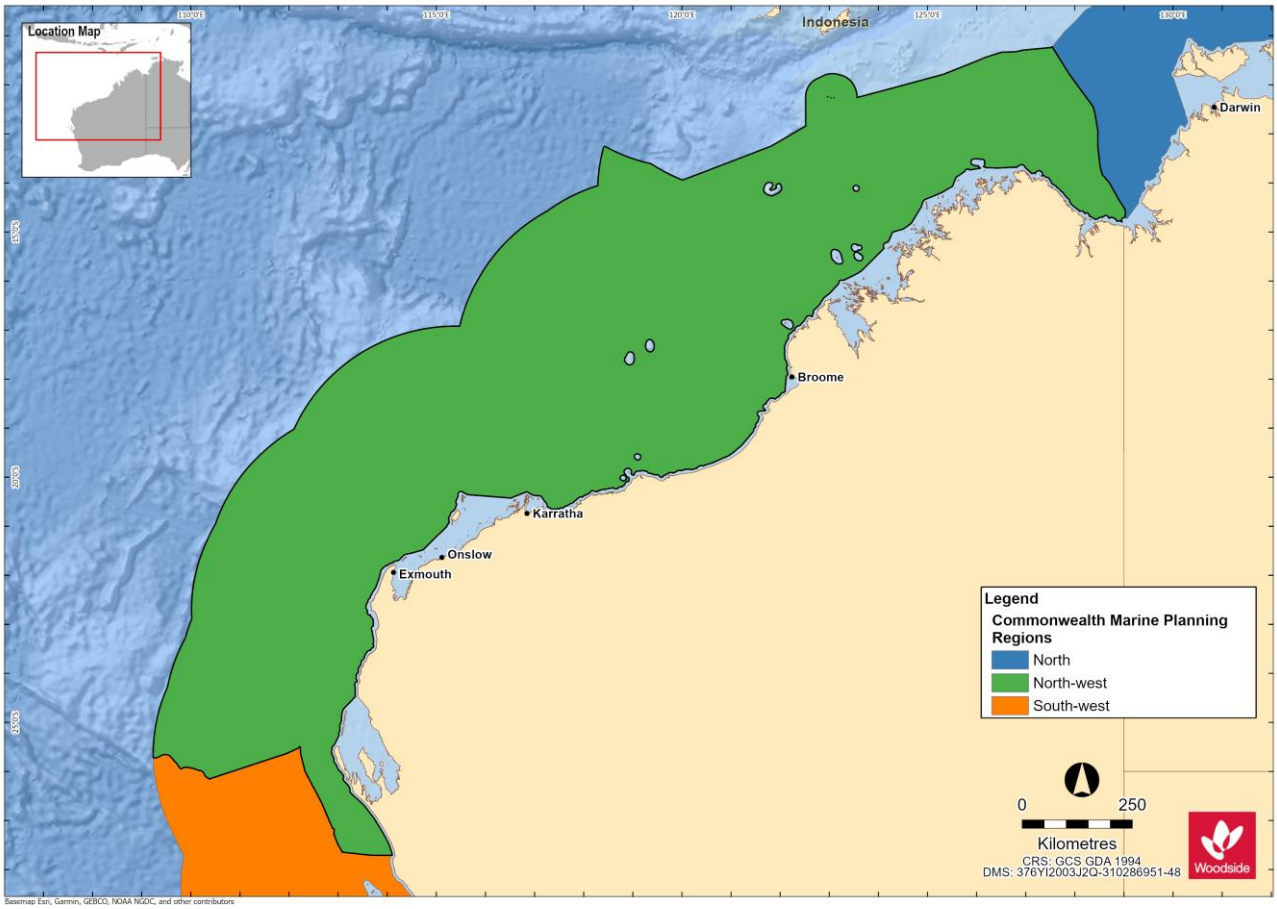


Figure 1-1. Marine Bioregions: North-west (NWMR), South-west (SWMR) and North (NMR)

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**.

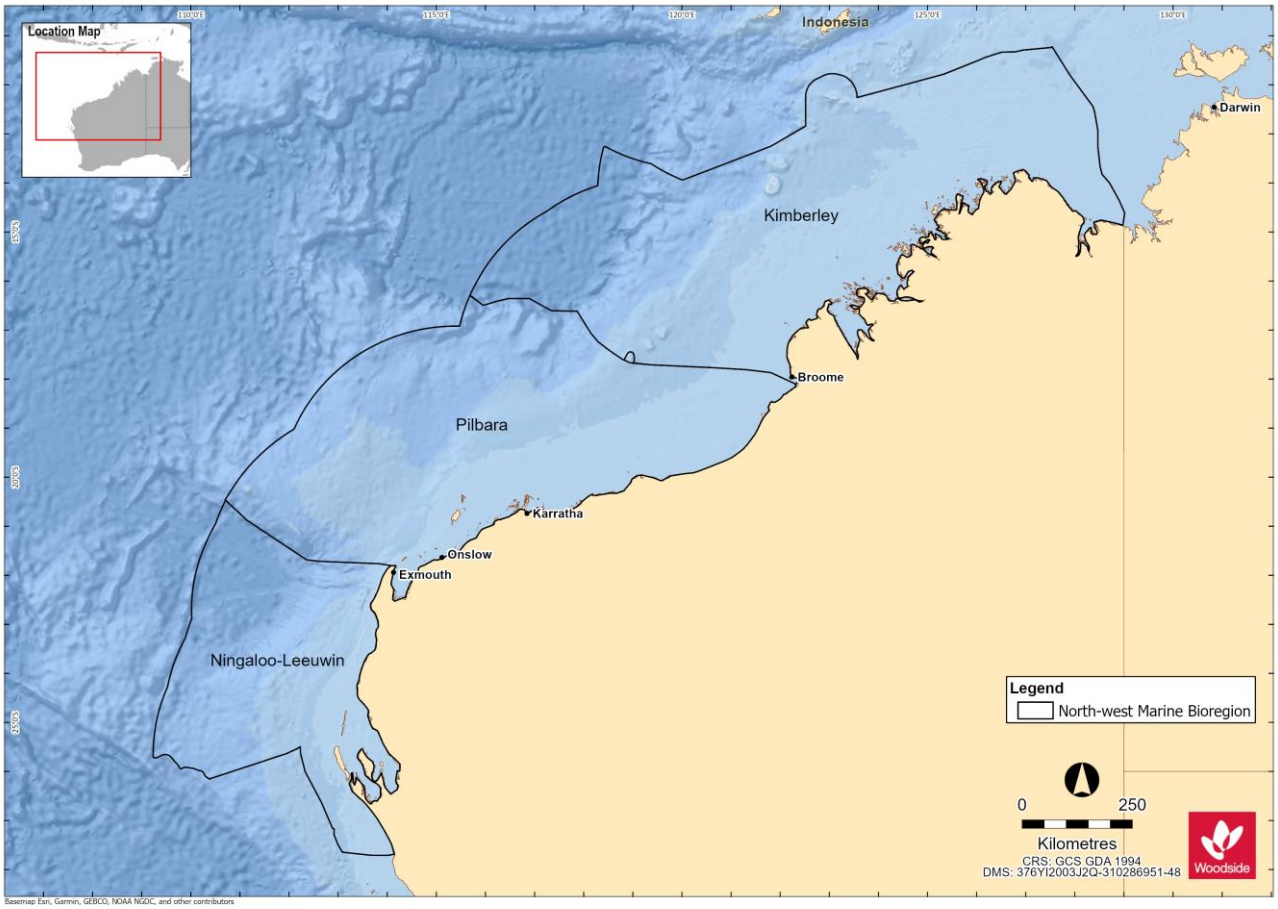


Figure 2-1. The marine systems of the North-west Marine Region (NWMR)

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).

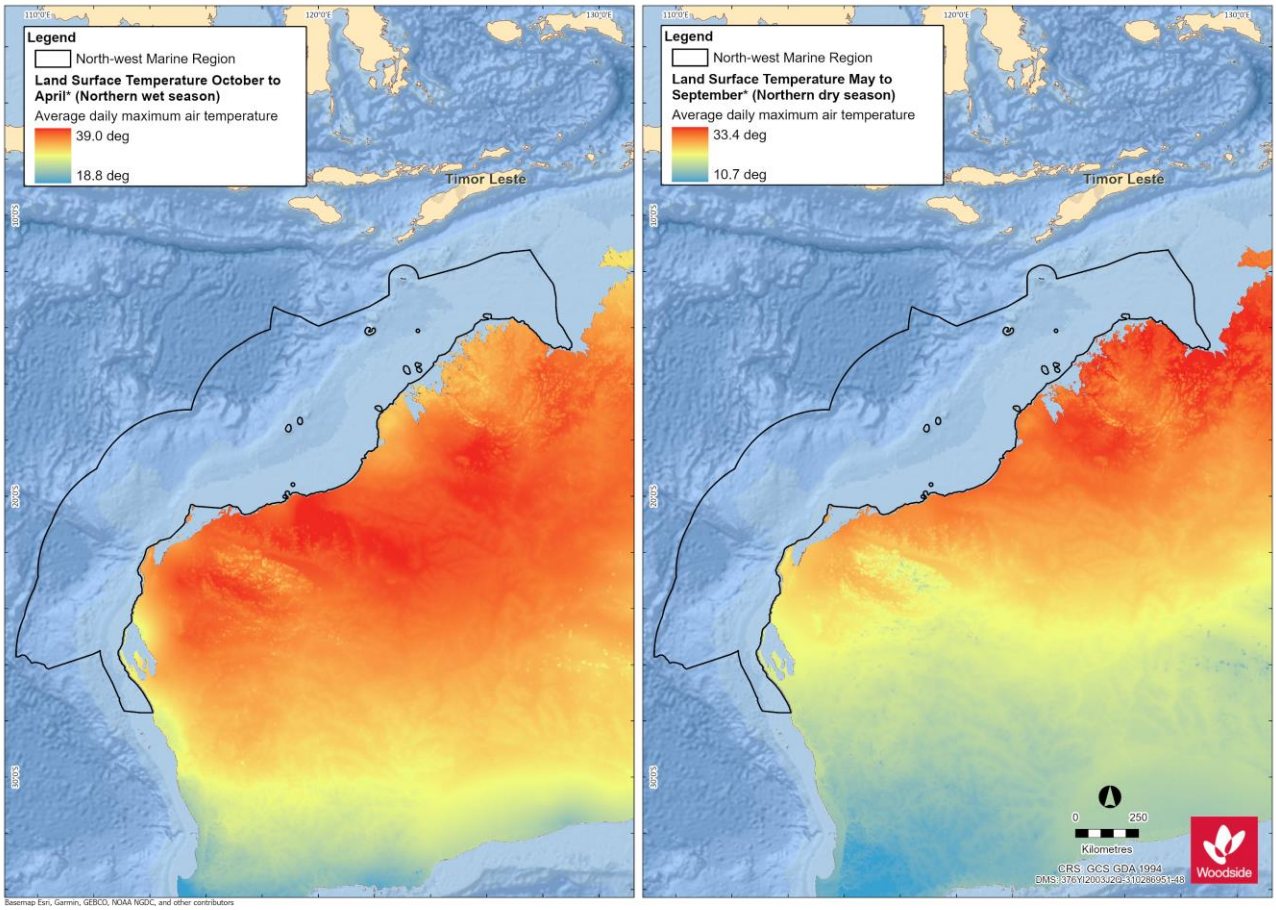


Figure 2-2. Average daily maximum air temperature for land surface adjacent to NWMR: (a) summer (northern wet season) and (b) winter (northern dry season)

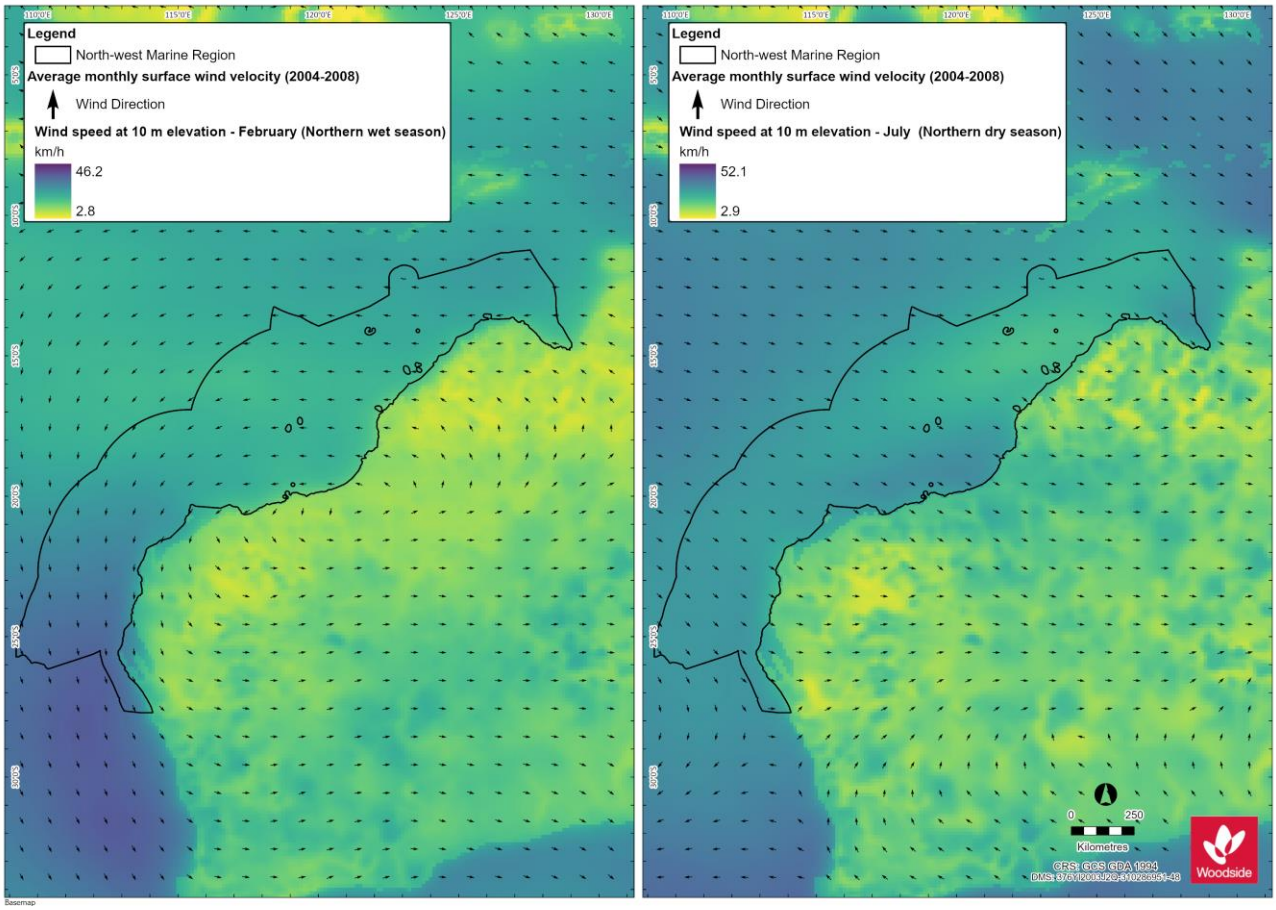


Figure 2-3. Average monthly surface wind direction and velocity for NWMR: (a) summer (February, northern wet season) and (b) winter (July, northern dry season)

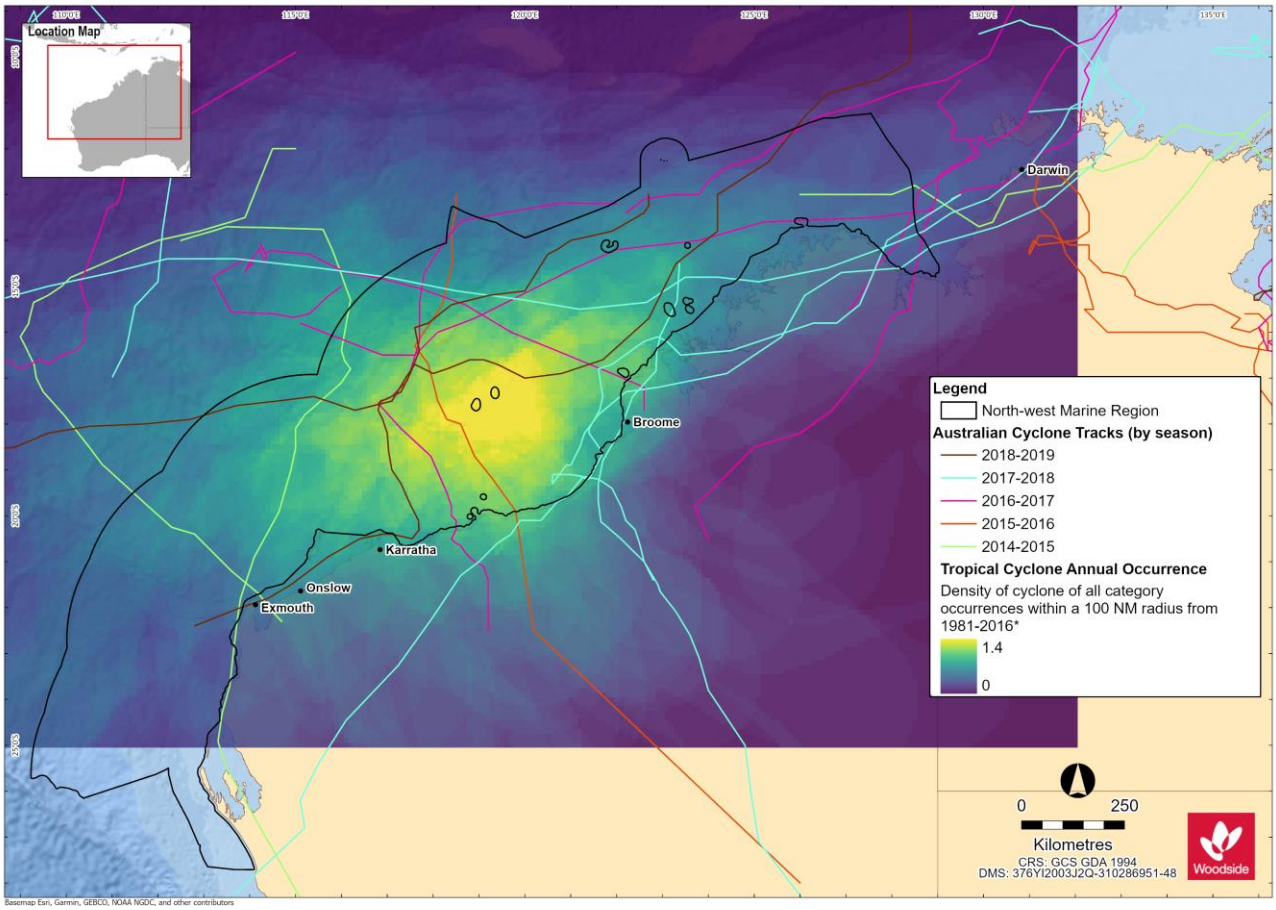


Figure 2-4. Tropical cyclone annual occurrence and cyclone tracks for NWMR

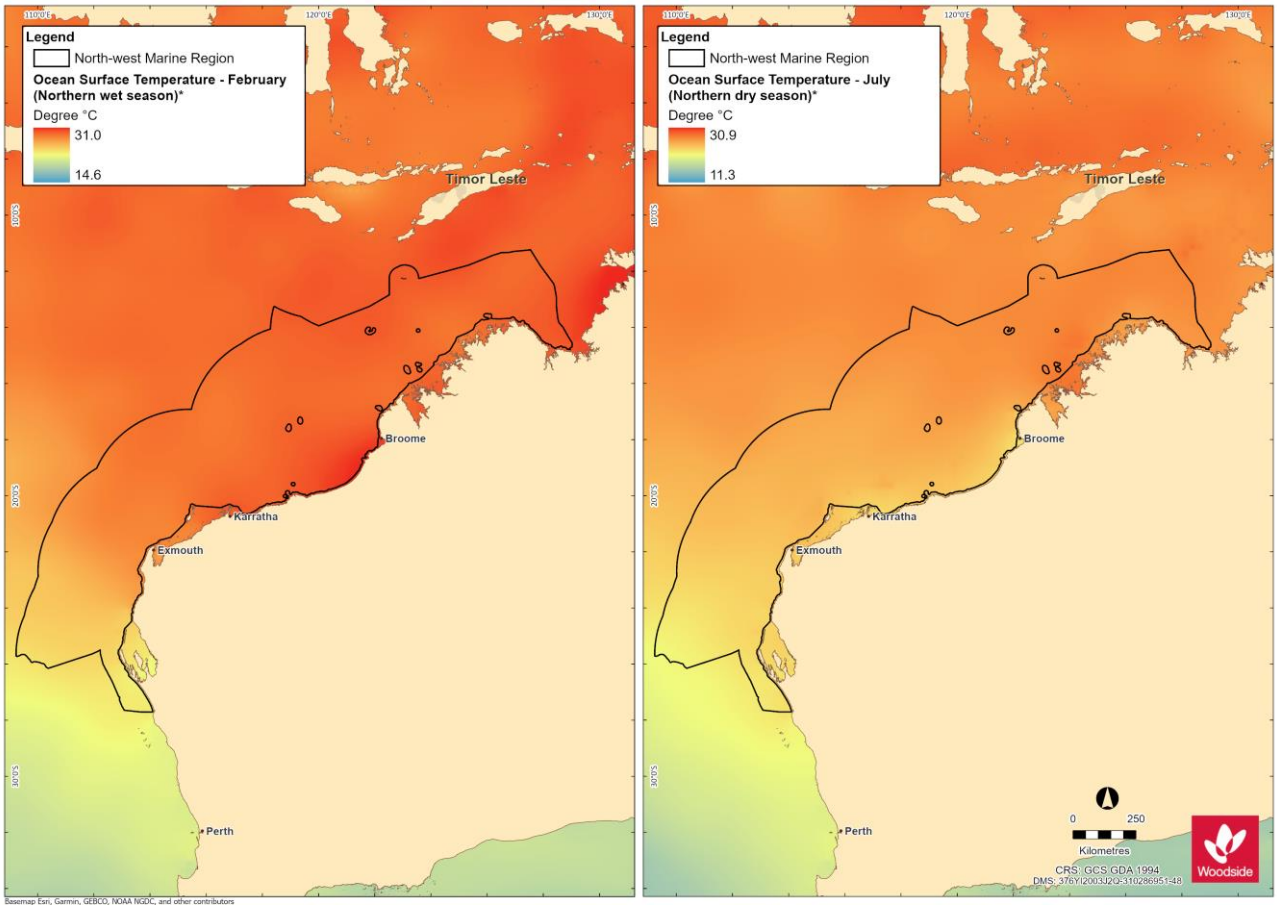


Figure 2-5. Ocean surface temperature for NWMR: (a) summer (February, northern wet season) and (b) winter (July, northern dry season)

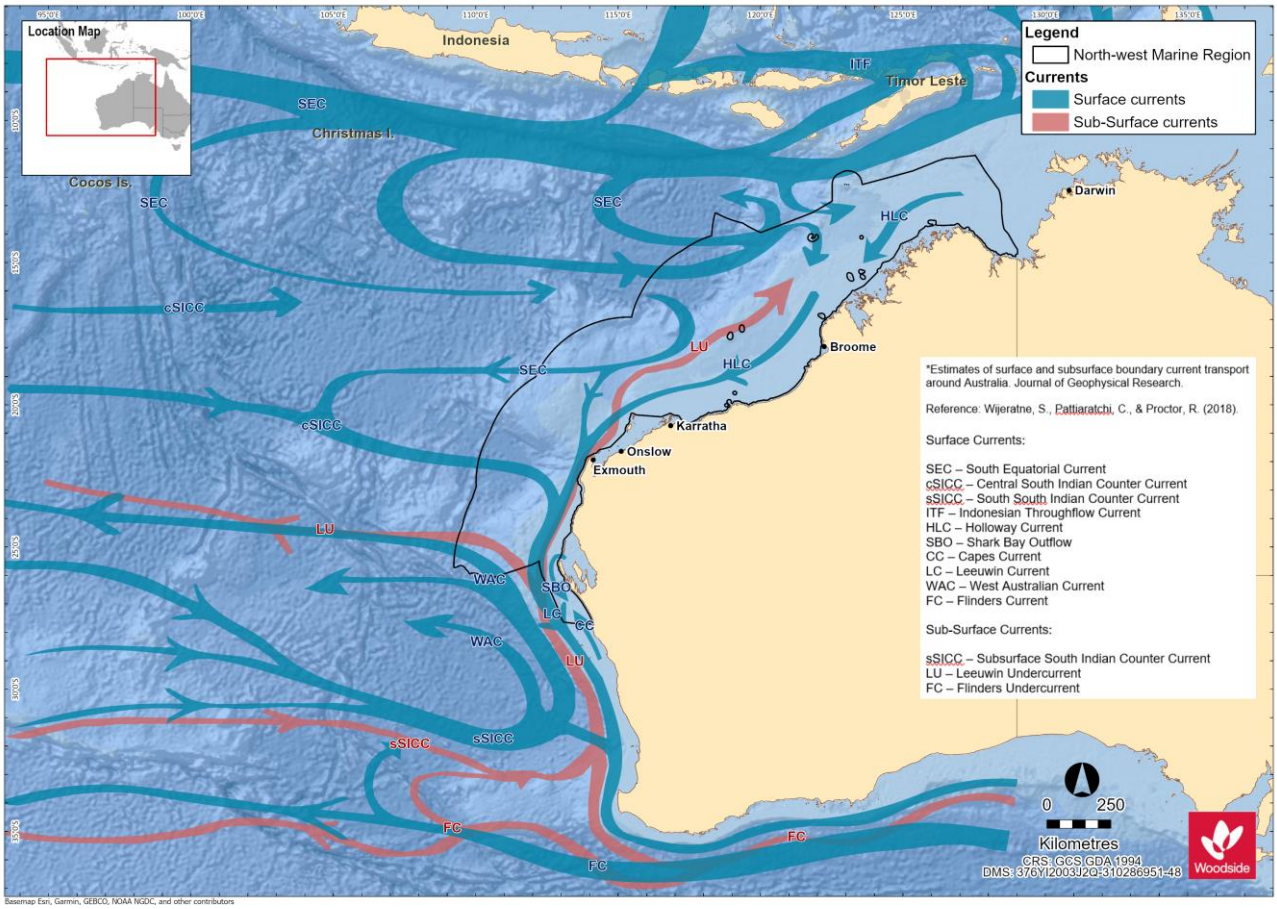


Figure 2-6. Ocean surface and sub-surface currents of the NWMR and wider region

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.

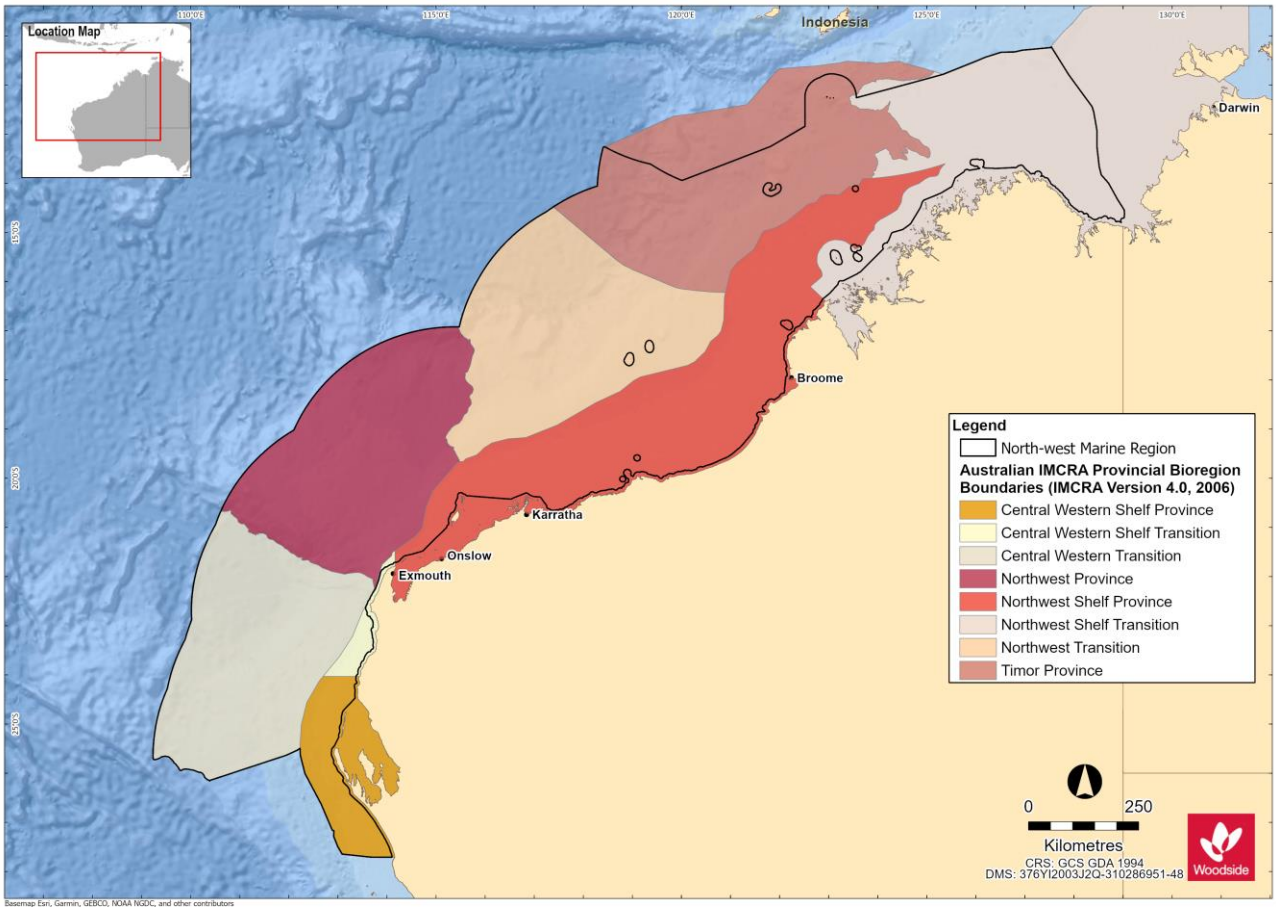


Figure 2-7. The eight provincial bioregions of the NWMR (Commonwealth of Australia, 2006)

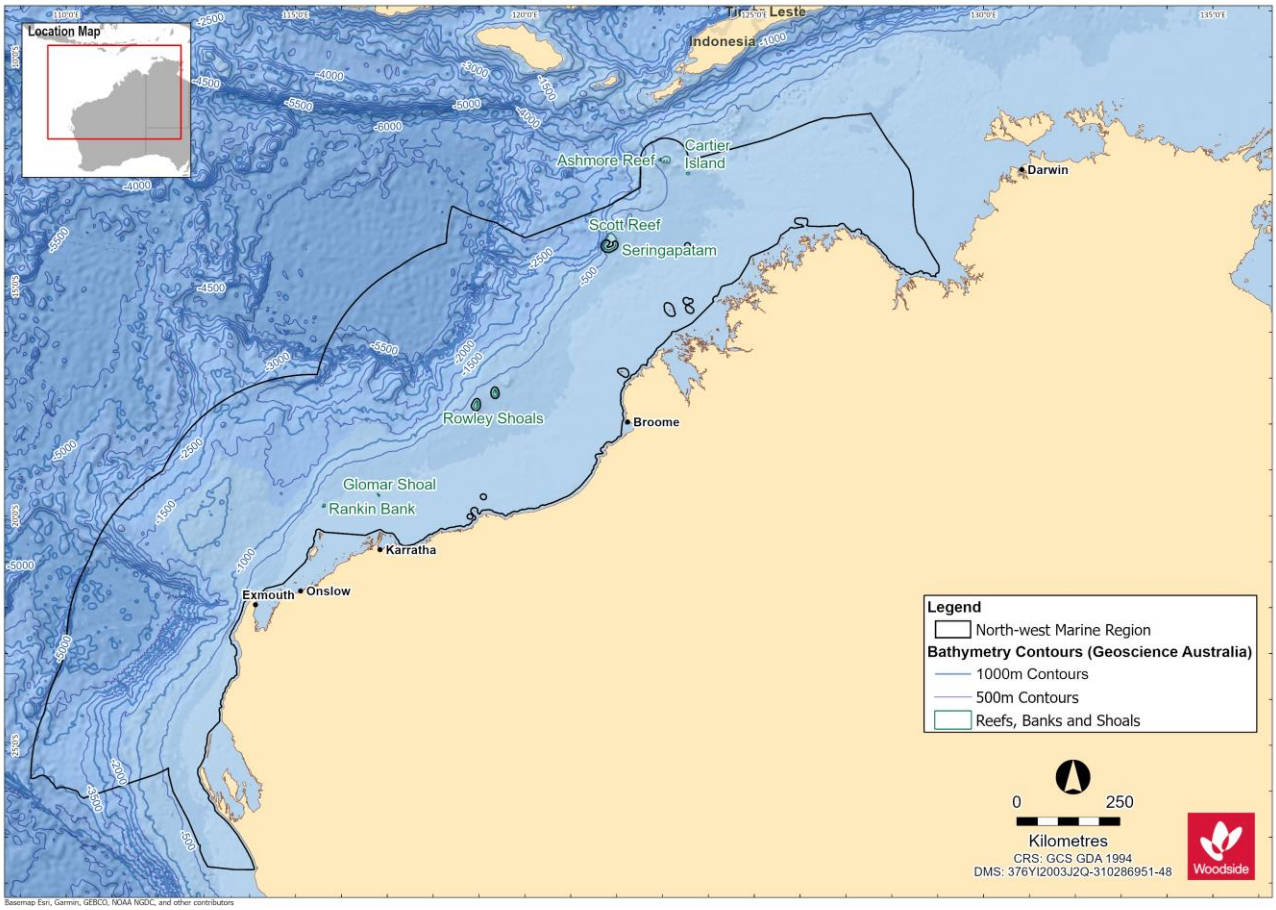


Figure 2-8. Bathymetry of the NWMR

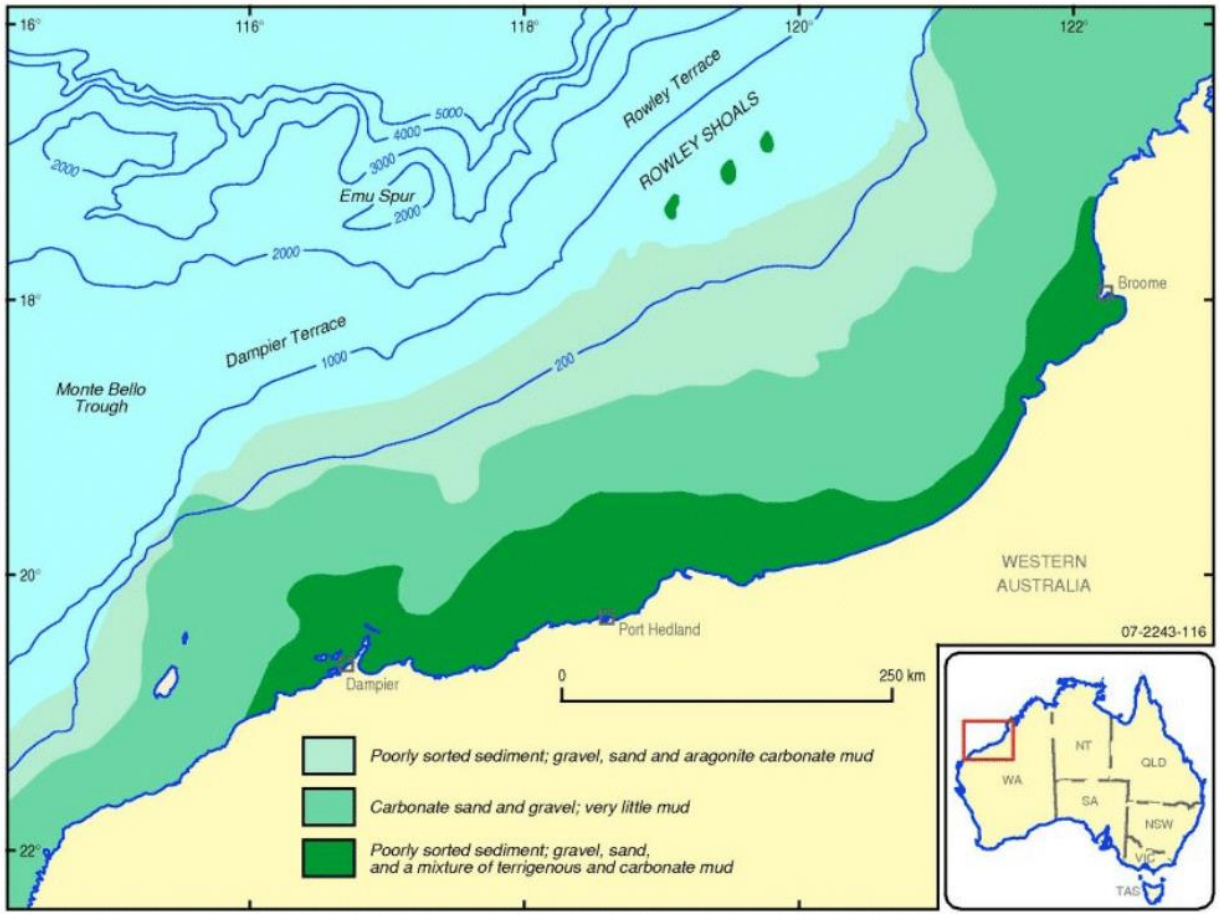


Figure 2-9. Overview of the seabed sediments of the NWMR (Baker *et al*., 2008)

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

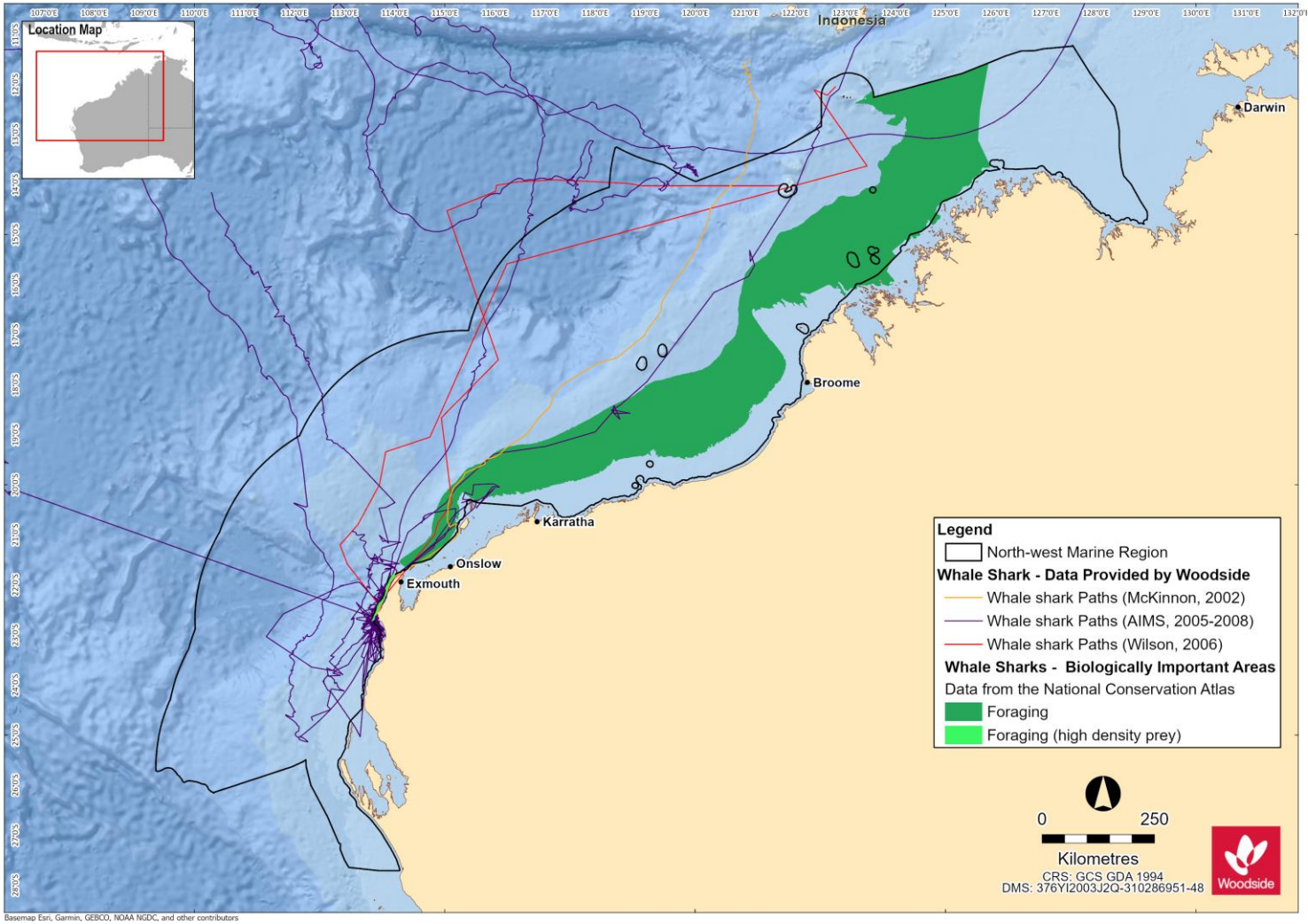


Figure 5-1 Whale shark BIAs for the NWMR and tagged whale shark tracks

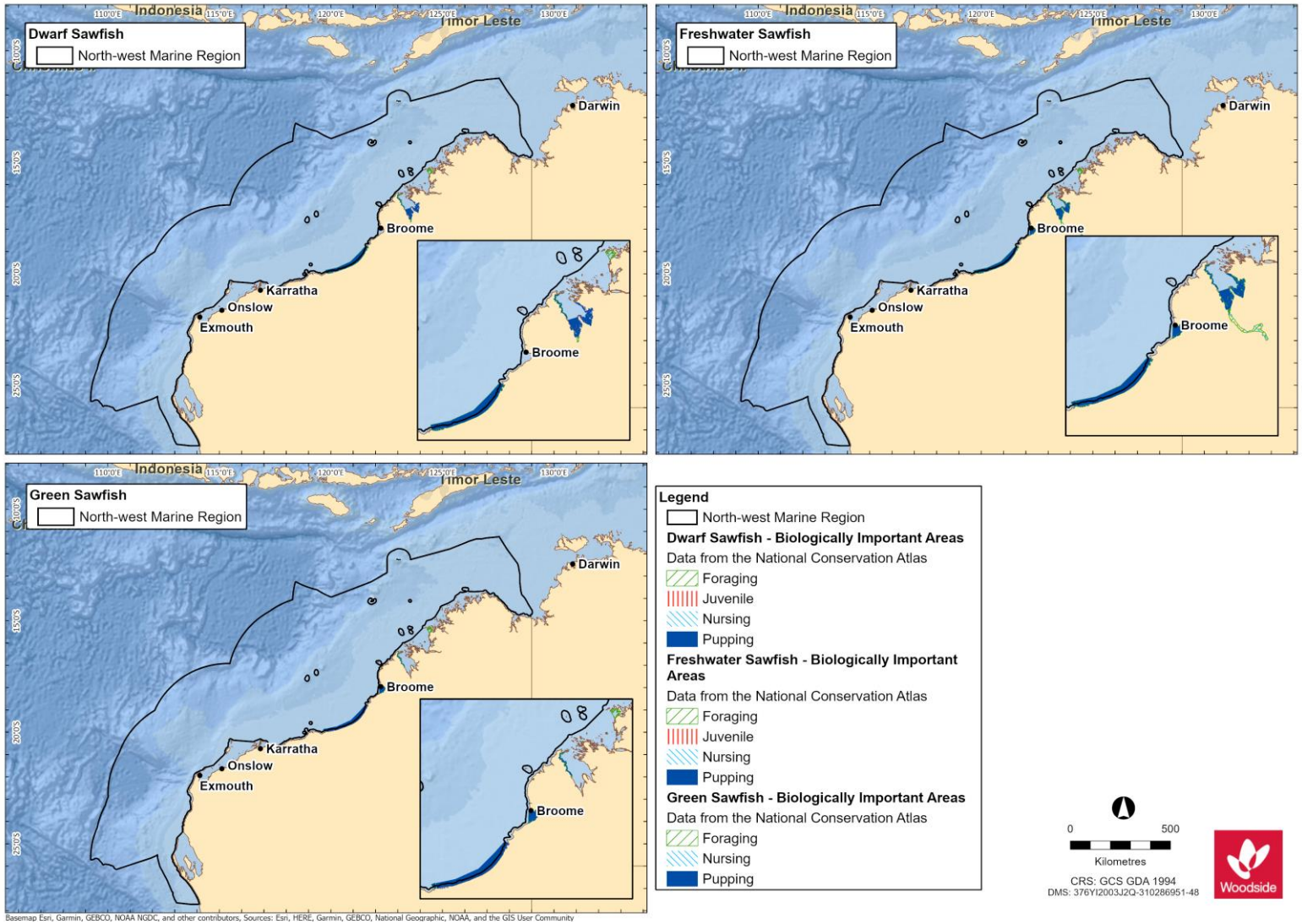


Figure 5-2 Sawfish BIAs for the NWMR

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).

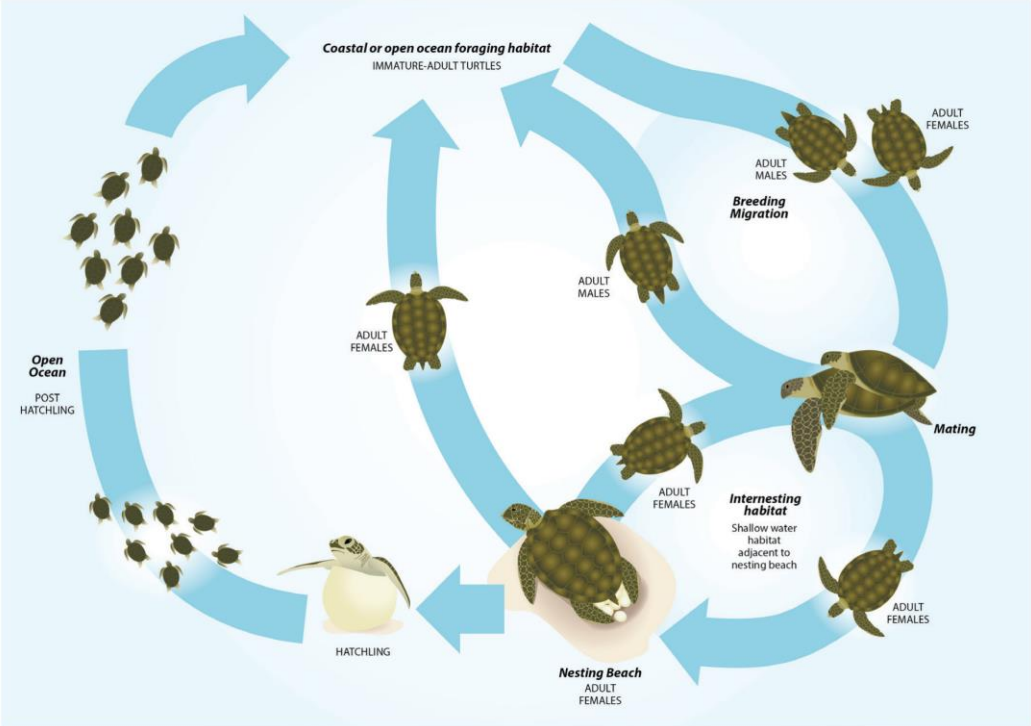


Figure 6-1 Generalised life cycle of marine turtles (Commonwealth of Australia, 2017)

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)*

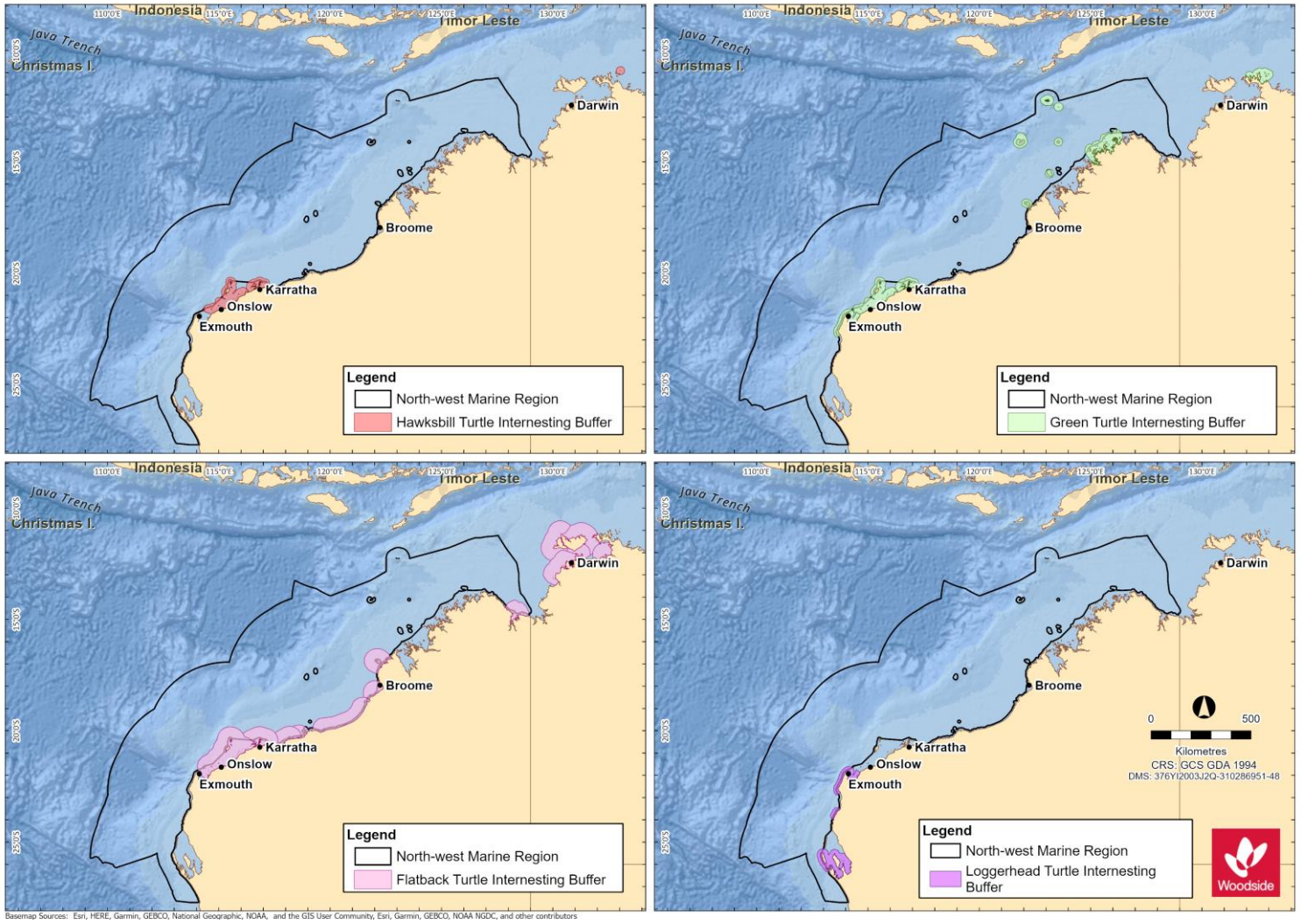


Figure 6-2 Marine turtle species habitat critical to survival (nesting beaches and internesting buffers) for the NWMR

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.

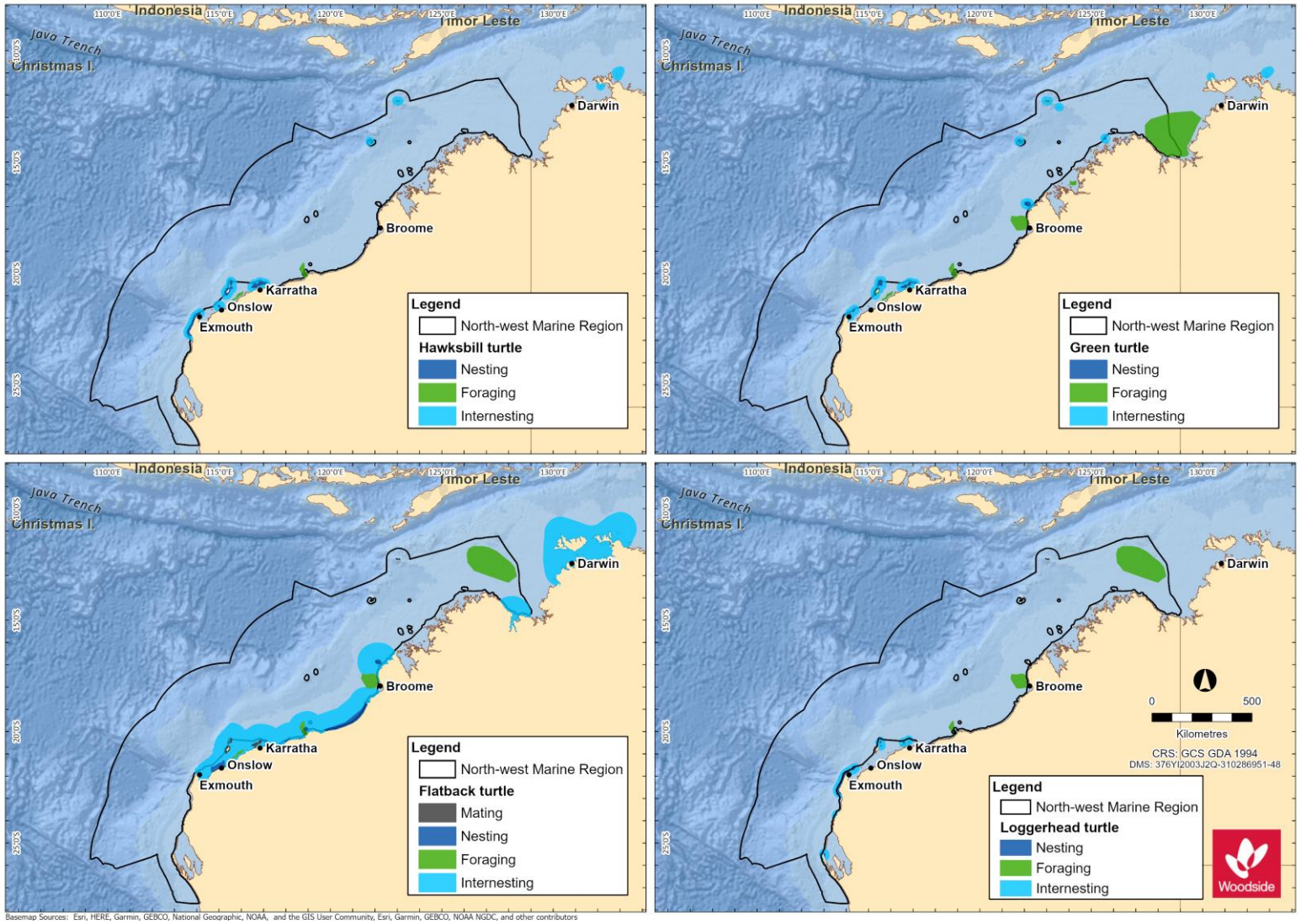


Figure 6-3 Marine turtle species BIAs within the NWMR

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)*

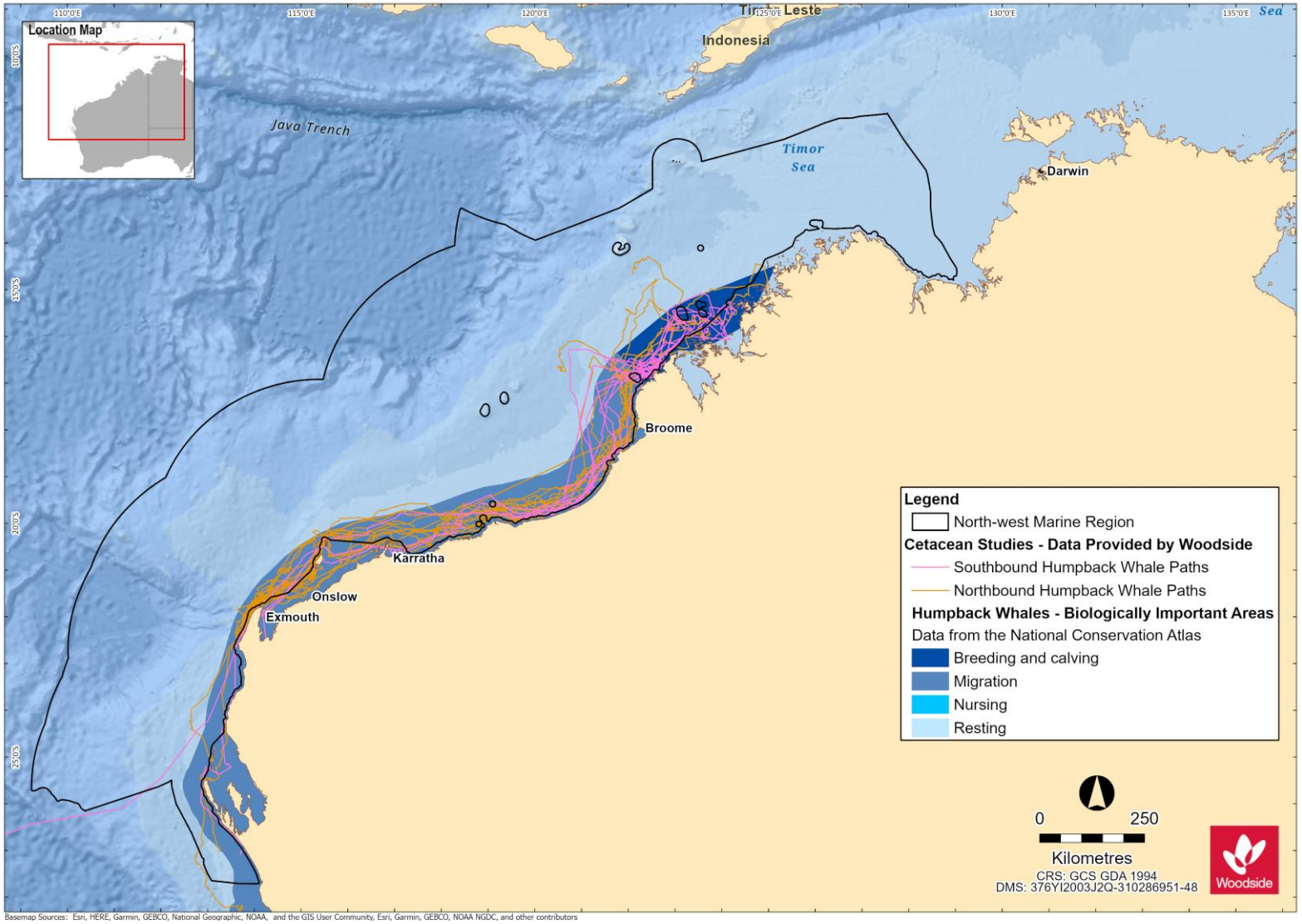


Figure 7-1 Humpback whale BIAs for the NWMR and tagged tracks for north and south bound migrations

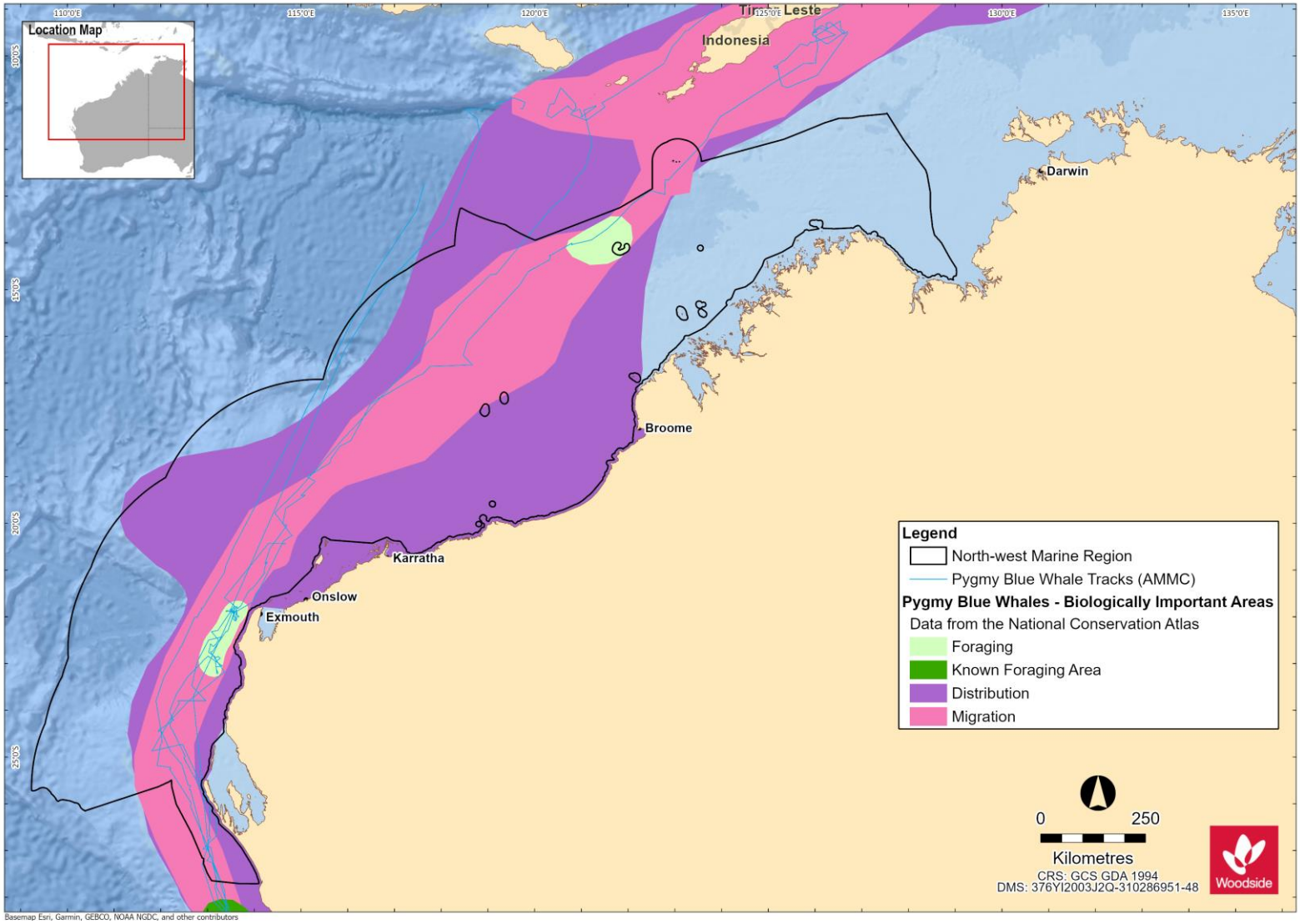


Figure 7-2 Pygmy blue whale BIAs for the NWMR and tagged whale tracks for northbound migration

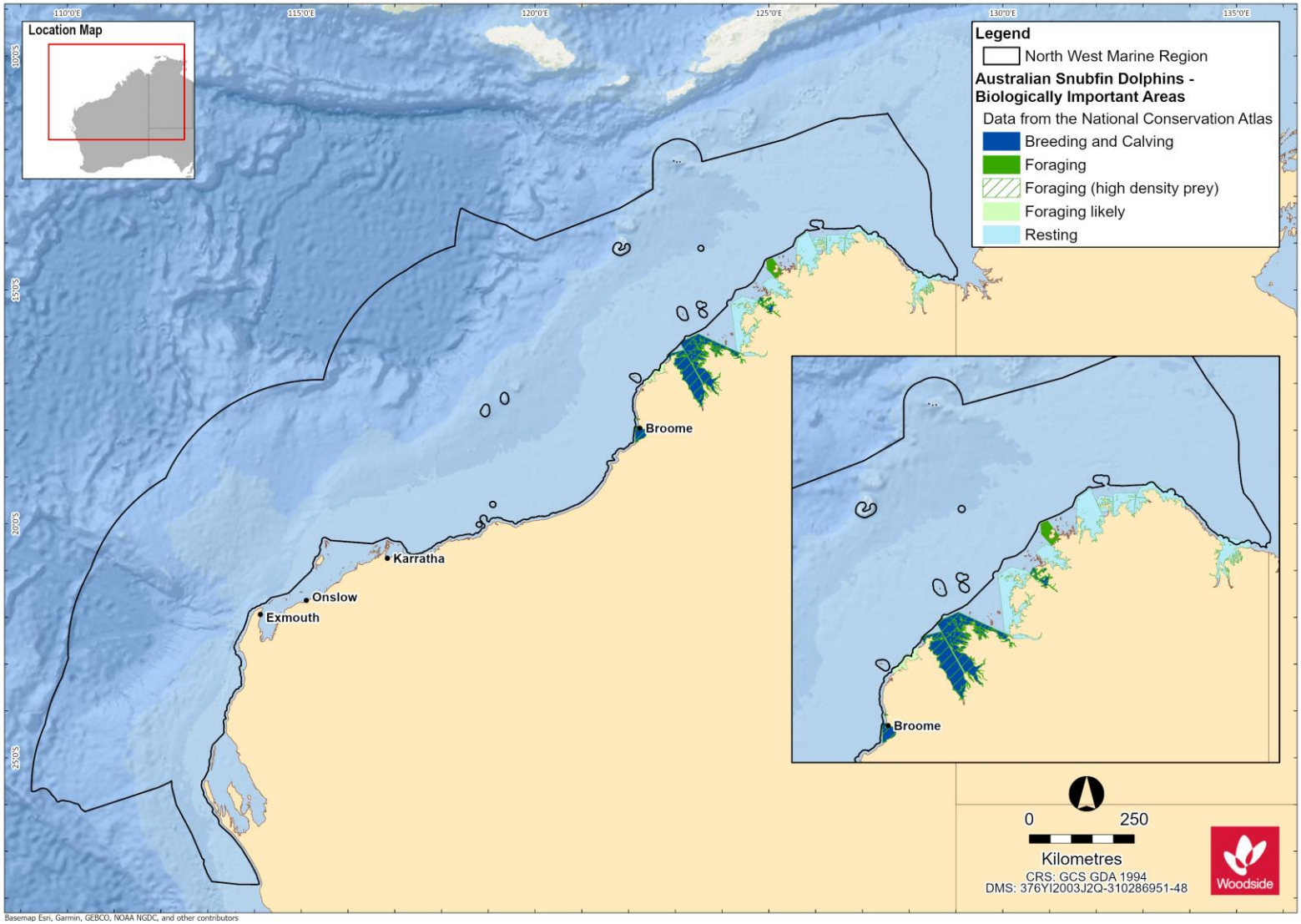


Figure 7-3 Australian snubfin dolphin BIAs for the NWMR

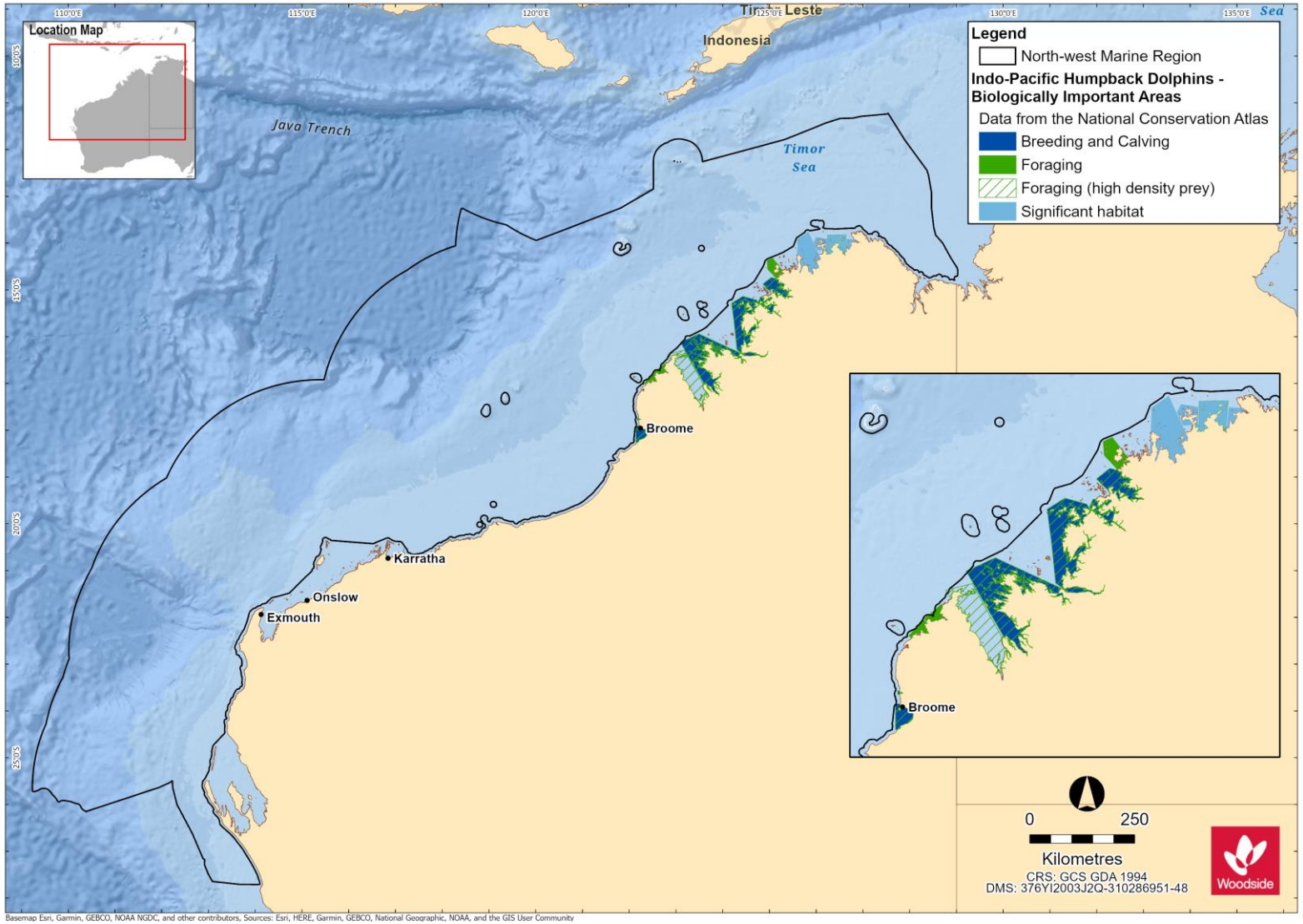


Figure 7-4 Indo-Pacific humpback dolphin BIAs for the NWMR

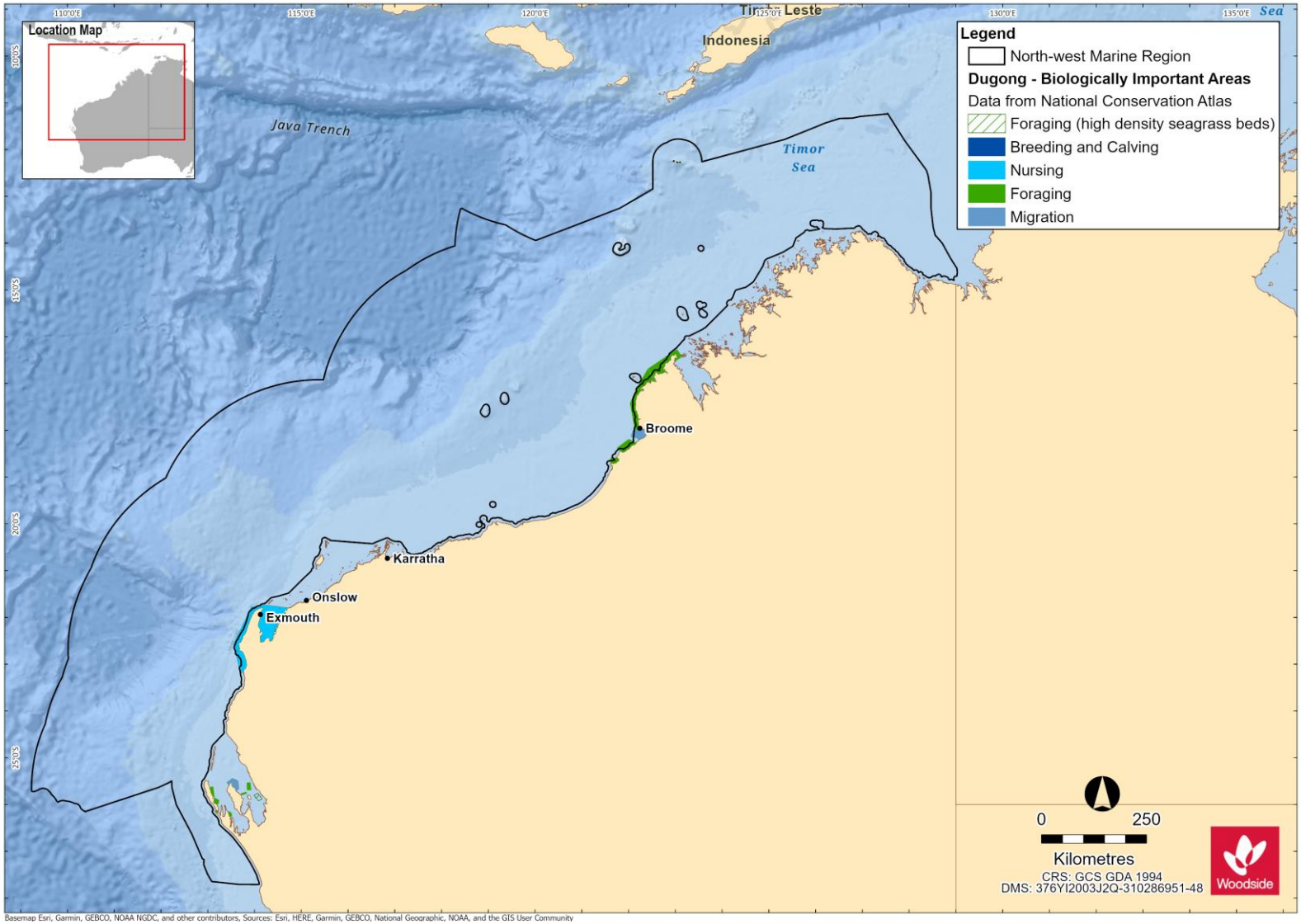


Figure 7-5 Dugong BIAs for the NWMR

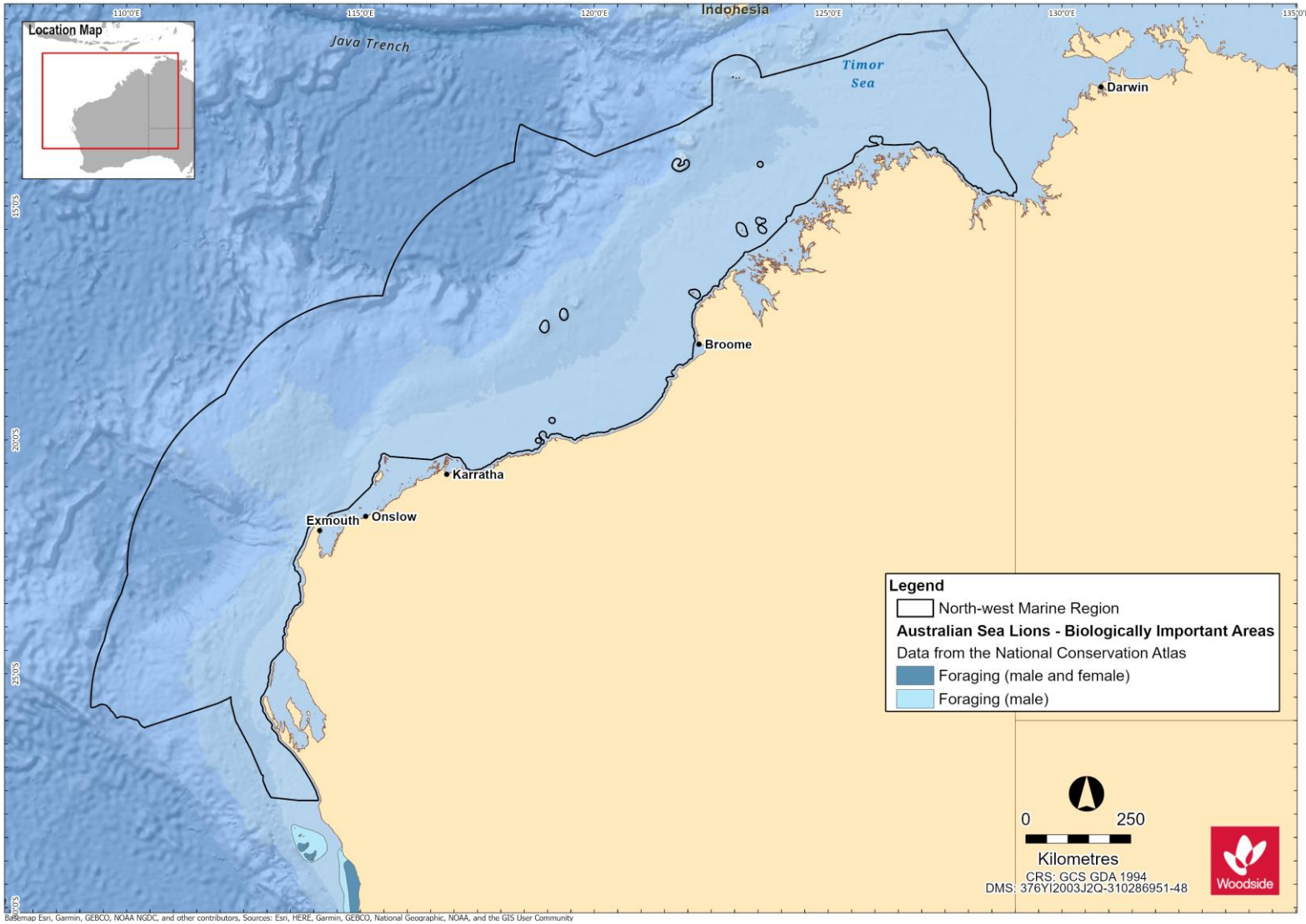


Figure 7-6 Australian sea lion BIAs in the northern extent of the SWMR closest to the NWMR

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	

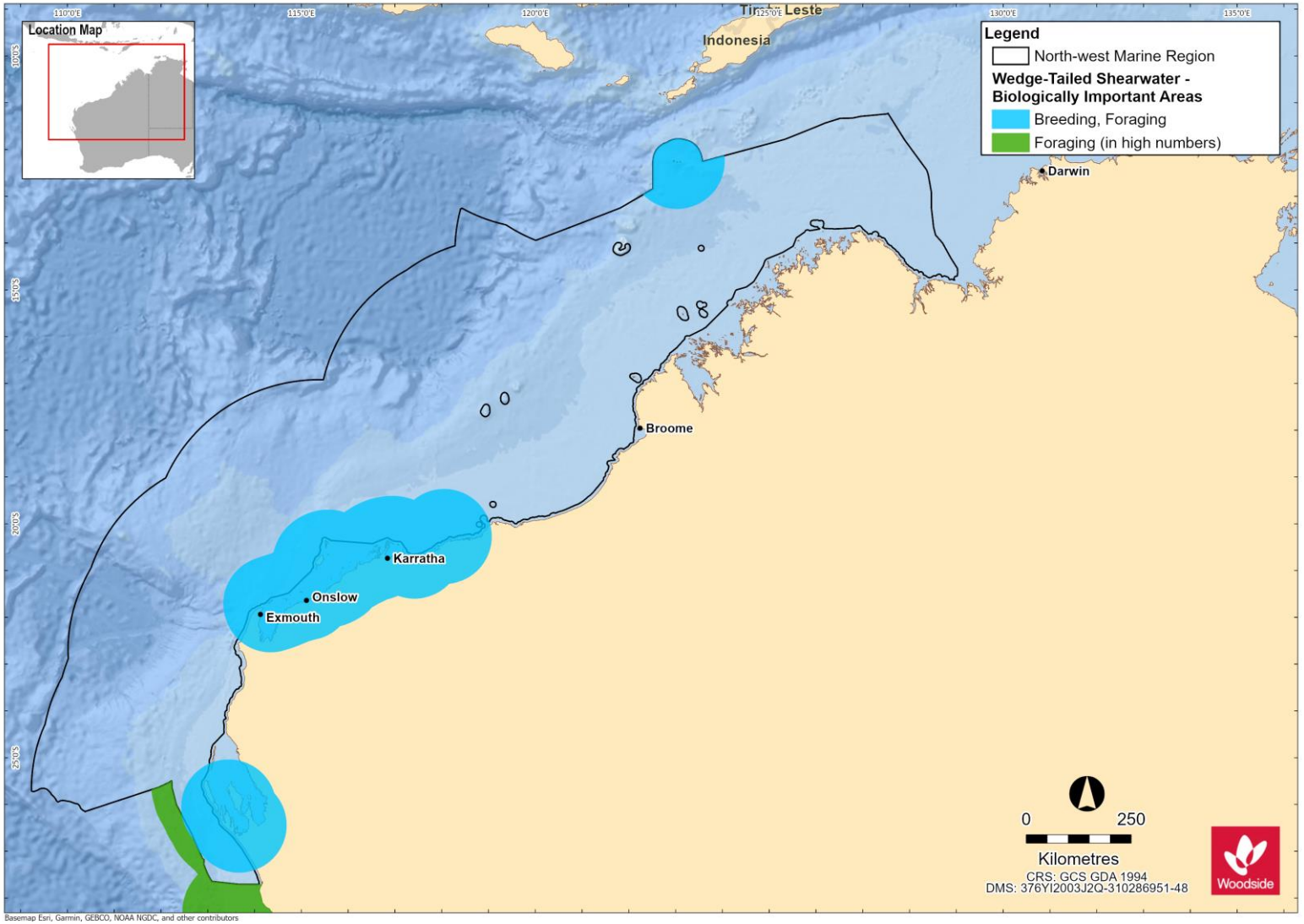


Figure 8-1 Wedge-tailed shearwater BIAs for the NWMR

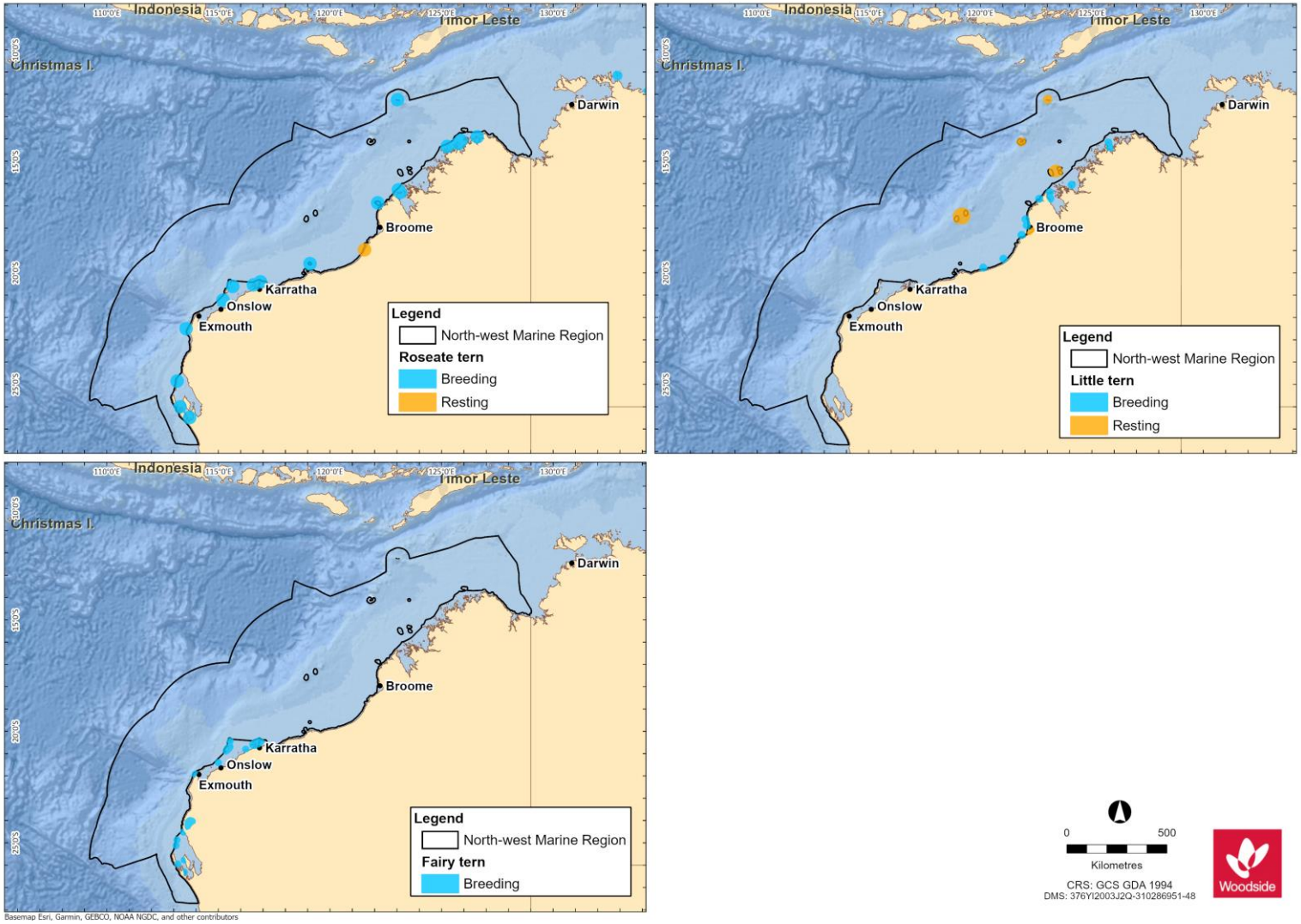


Figure 8-2 Tern species BIAs for the NWMR

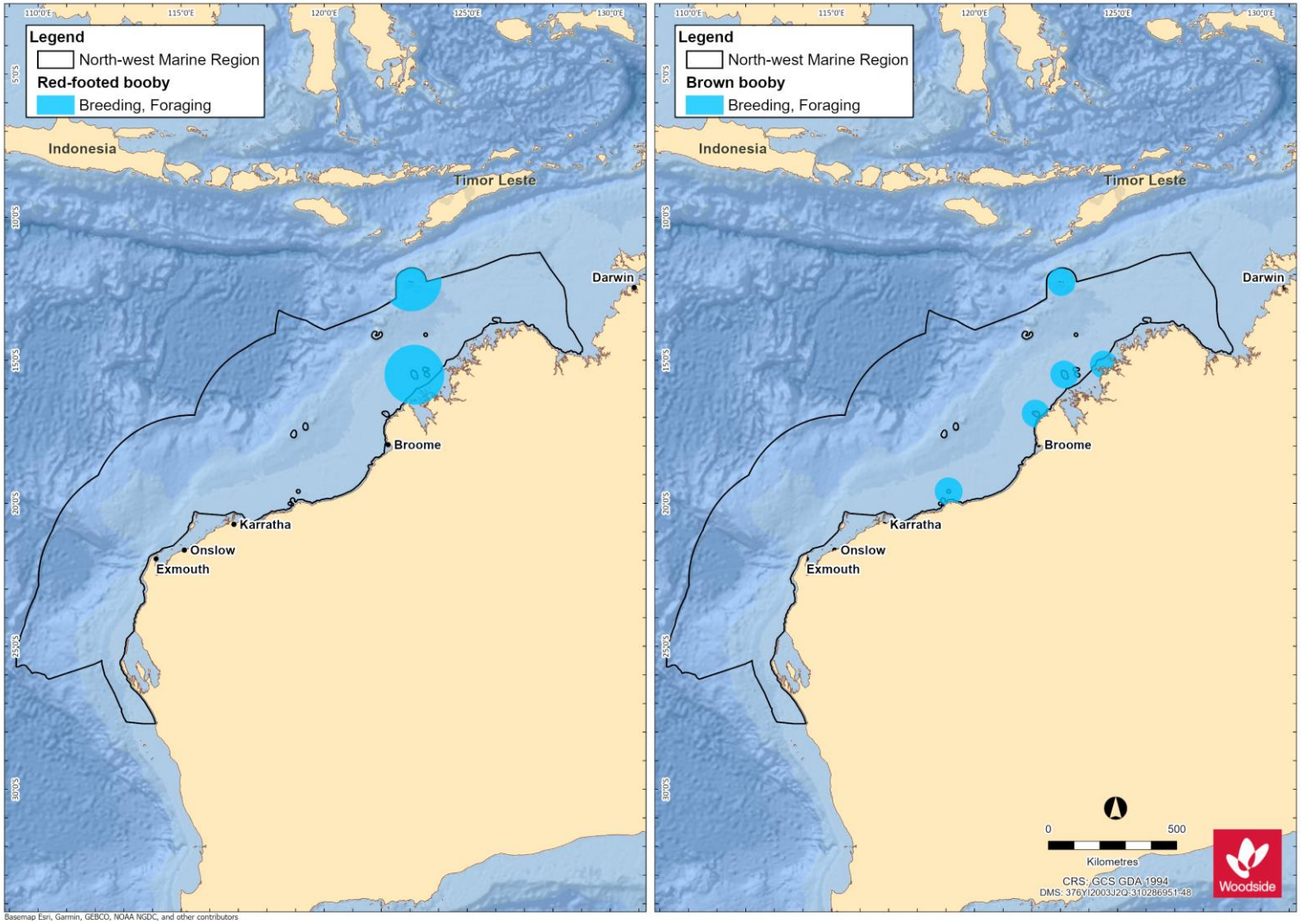


Figure 8-3 Red-footed and brown booby BIAs for the NWMR

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.

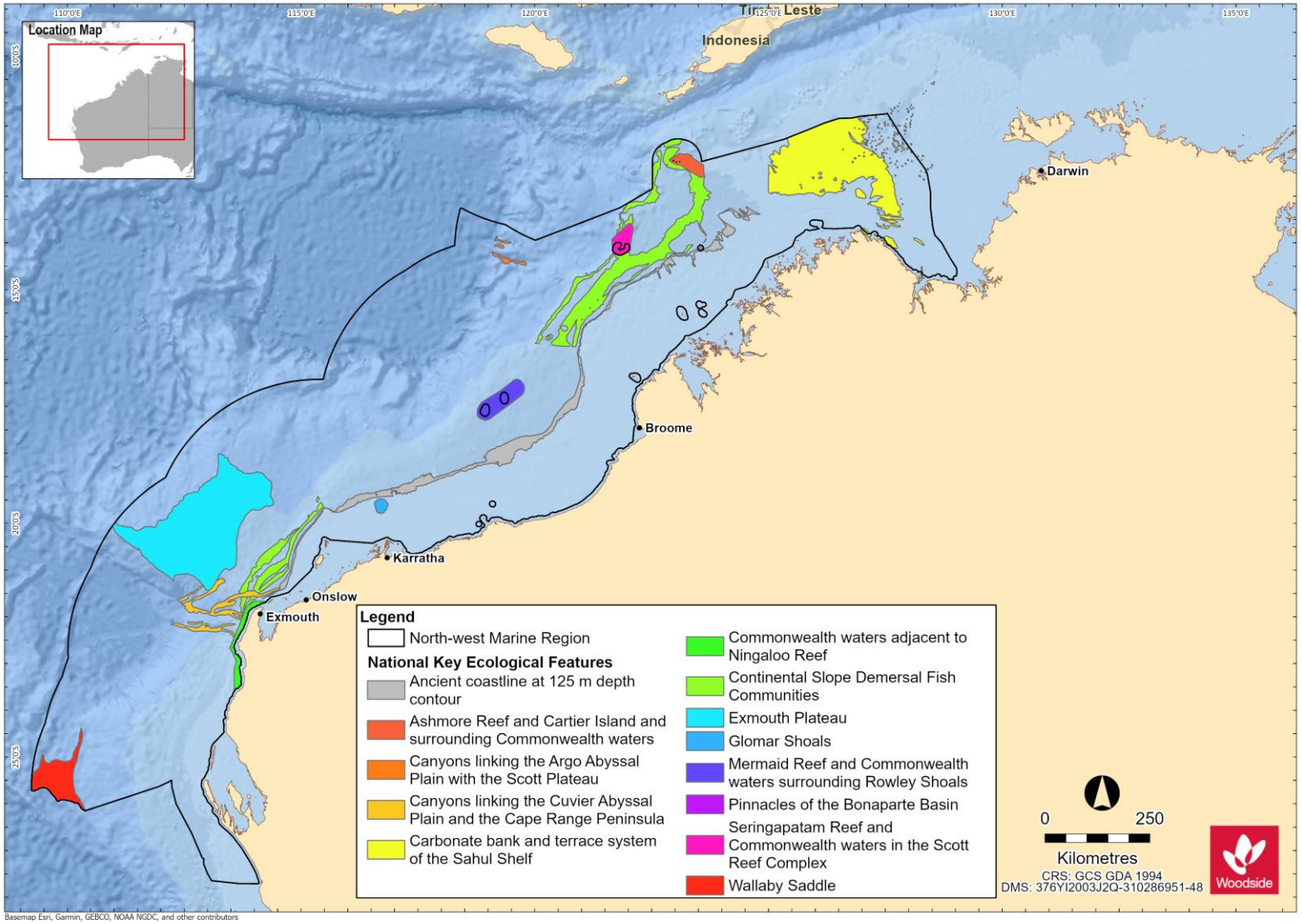


Figure 9-1 Key Ecological Features (KEFs) within the NWMR.

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

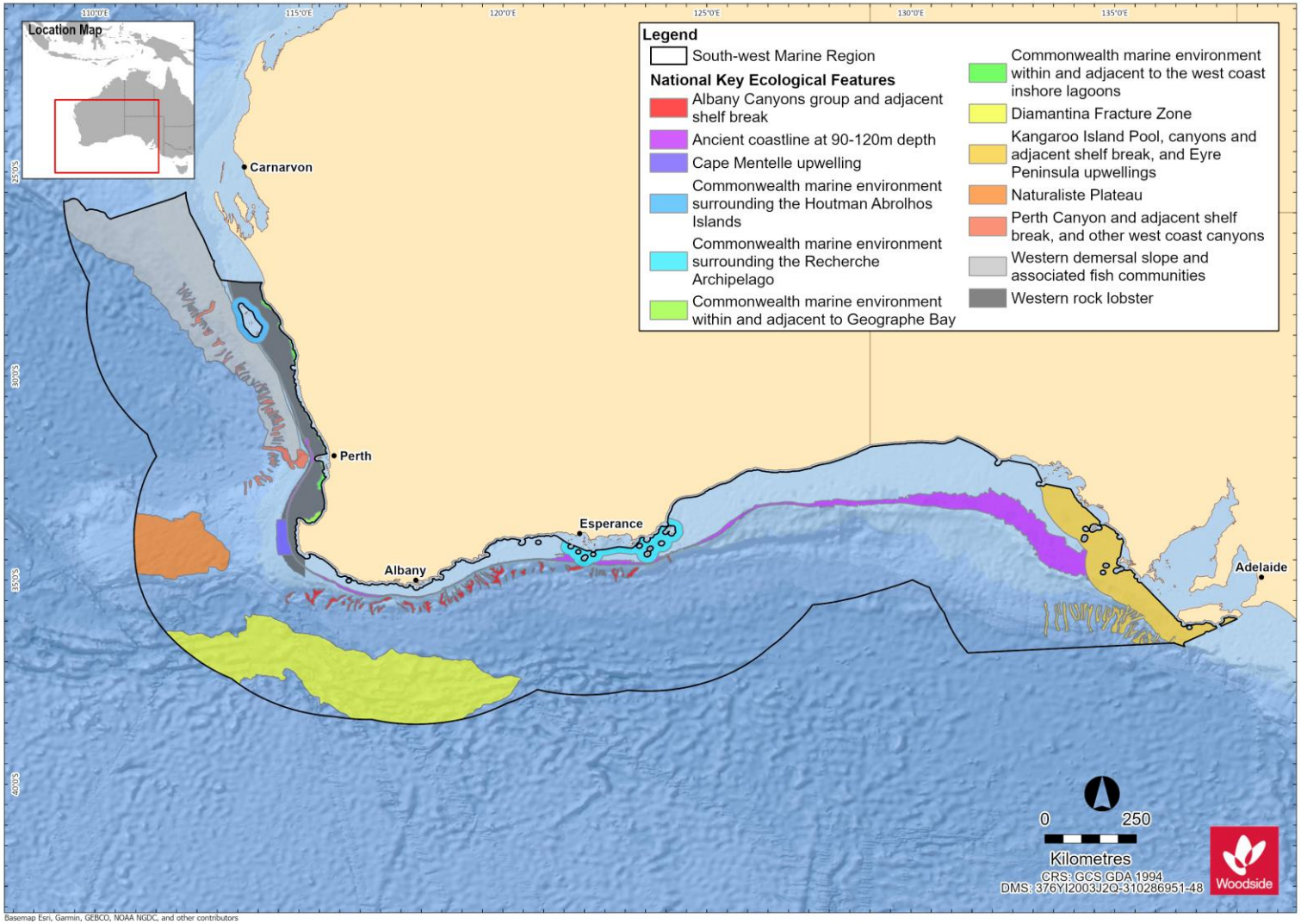


Figure 9-2. Key Ecological Features (KEFs) within the SWMR

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.*

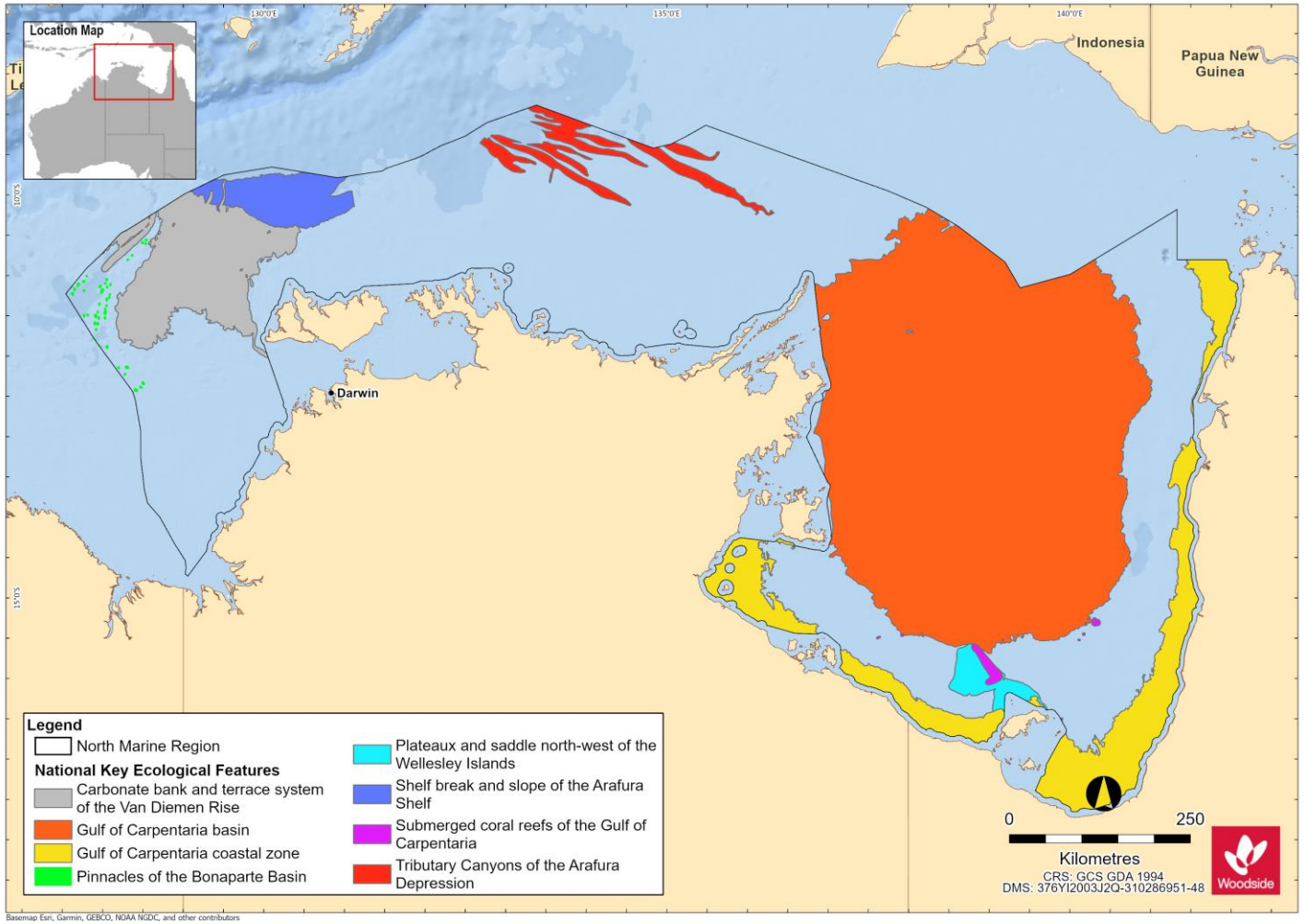


Figure 9-3. Key Ecological Features (KEFs) within the NMR

.

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)

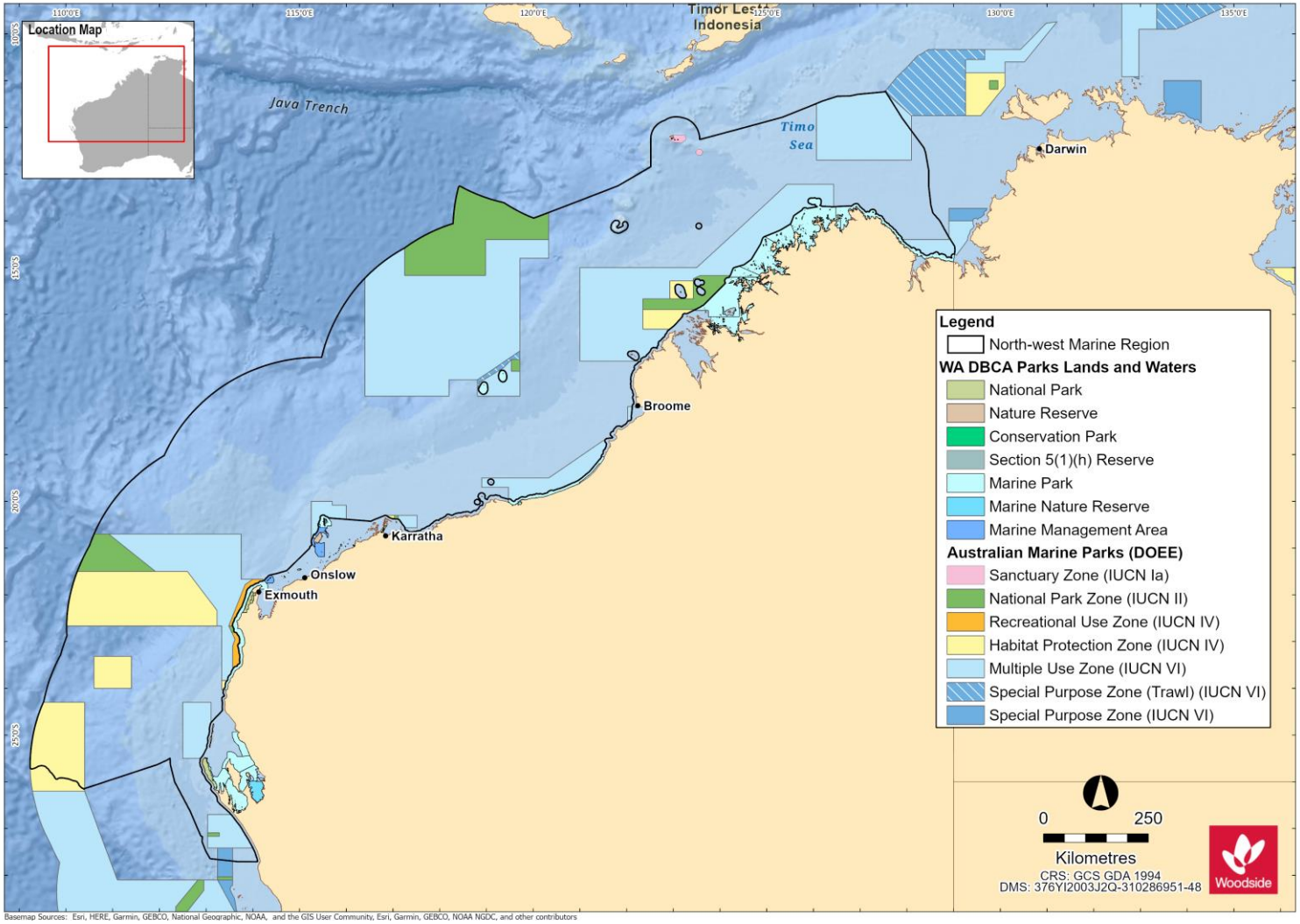


Figure 10-1 Commonwealth and State Marine Protected Areas for the NWMR

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)

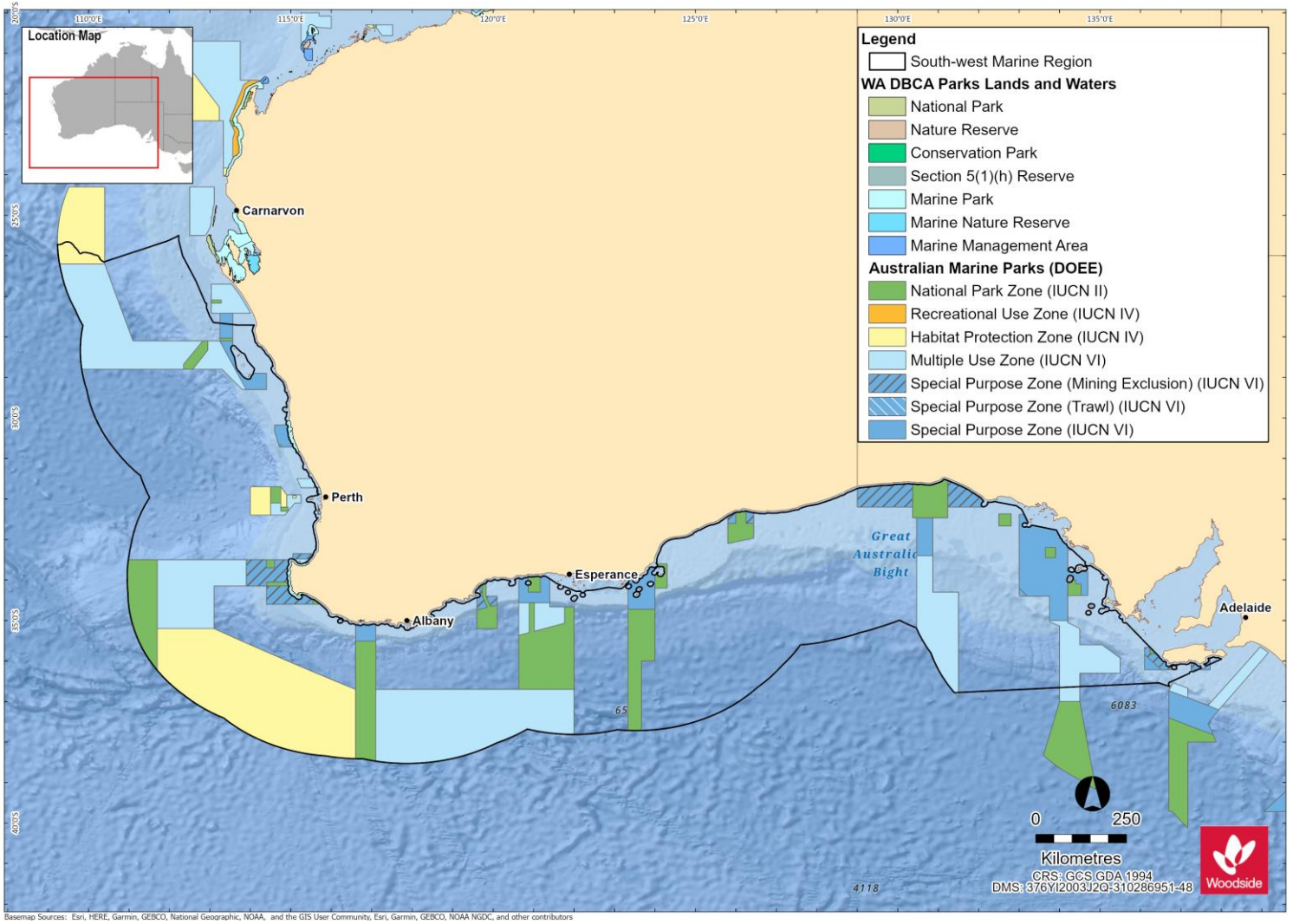


Figure 10-2. Commonwealth and State Marine Protected Areas for the SWMR

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)

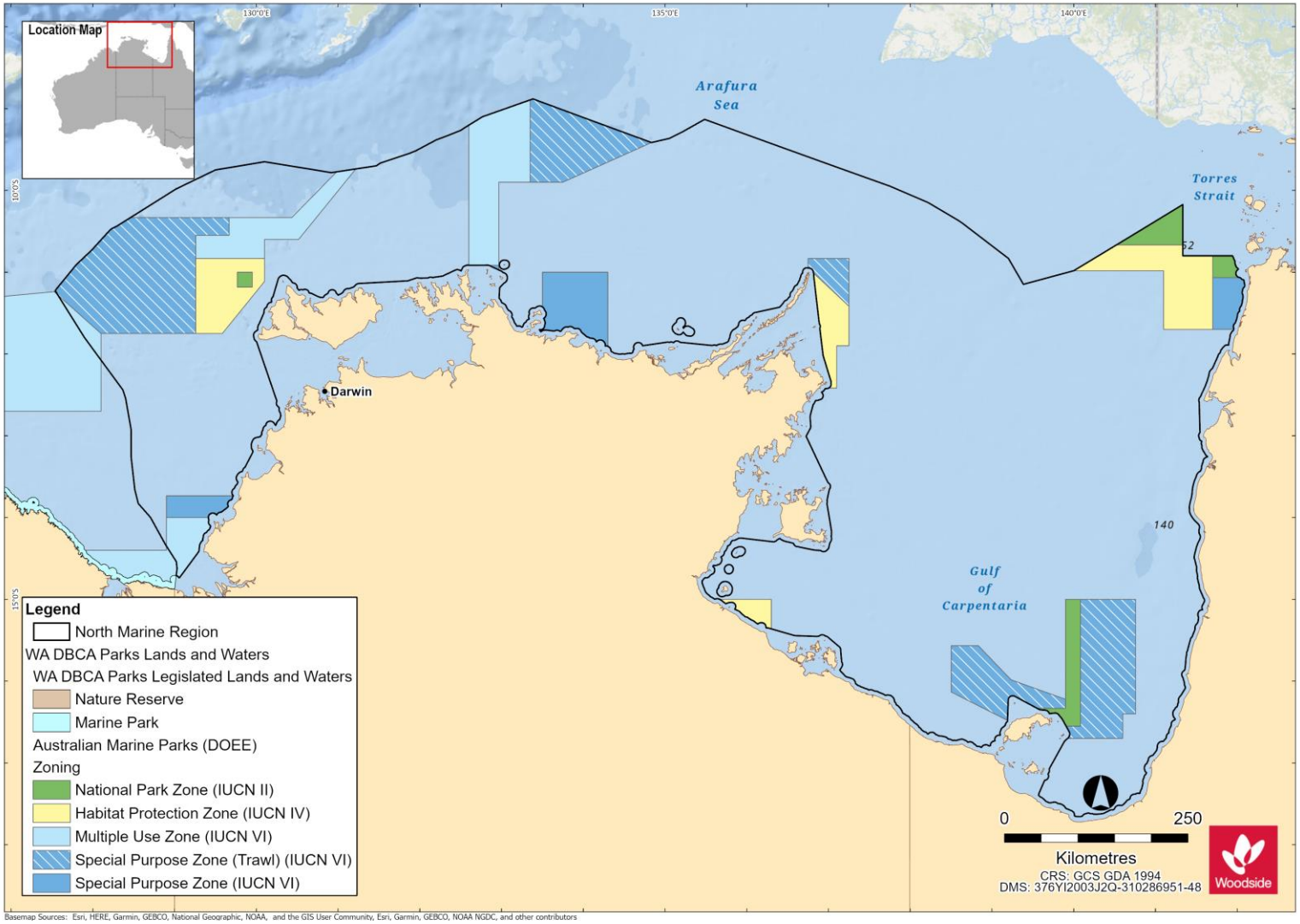


Figure 10-3. Commonwealth and State Marine Protected Areas within the NMR

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>
<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>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>
</td></tr>
</table>

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/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.

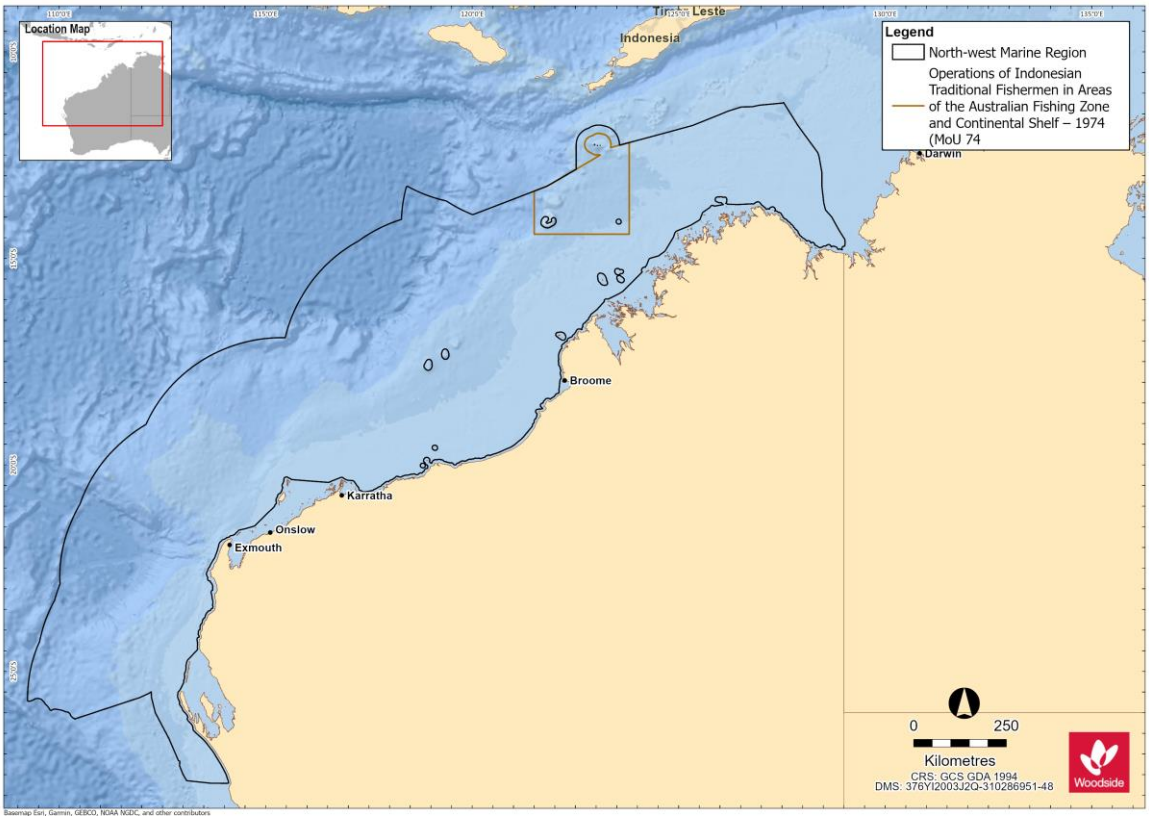


Figure 11-1 MOU 74 Box. Operations of Indonesian Traditional Fishermen in Areas of the Australian Fishing Zone and Continental Shelf – 1974

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:

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:

http://www.environment.gov.au/biodiversity/threatened/species/pubs/879-conservation-advice-05052016.pdf

Threatened Species Scientific Committee 2018. Listing Advice *Sphyrna lewini* scalloped hammerhead. Canberra: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/85267-listing-advice-15032018.pdf

Threatened Species Scientific Committee 2020a. Conservation Advice *Neophoca cinerea* Australian Sea Lion. Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/22-conservation-advice-23122020.pdf

Threatened Species Scientific Committee 2020b. Conservation Advice for the Abbott's Booby - *Papasula abbotti*. Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/59297-conservation-advice-19102020.pdf

Townsend, C.H. 1935. The distribution of certain whales as shown by logbook records of American whaleships. Zoologica 19: 3–50.

Udyawer, V., Read, M., Hamann, M., Heupel, M.R., and Simpfendorfer, C.A. 2016. Importance of shallow tidal habitats as refugia from trawl fishing for sea snakes. Journal of Herpetology 50: 527–533. https://doi.org.10.1670/15-026

Udyawer, V., Somaweera, R., Nitschke, C., d'Anastasi, B., Sanders, K., Webber, B.L., Hourston, M. and Heupel, M.R. 2020. Prioritising search effort to locate previously unknown populations of endangered marine reptiles. Global Ecology and Conservation 22. https://doi.org/10.1016/j.gecco.2020.e01013

Vincent, A.C.J. 1996. The international trade in seahorses. TRAFFIC International, Cambridge, UK. Available from: http://www.traffic.org/publication/96_International_Trade_Seahorse.pdf [Accessed 22 Sep 2020].

Voris, H.K. 1972. The role of sea snakes (Hydrophiidae) in the trophic structure of coastal ocean communities. Journal of the Marine Biological Association of India 14(2): 429- 442.

Voris, H.K. and Voris, H.H. 1983. Feeding strategies in marine snakes: an analysis of evolutionary, morphological, behavioral and ecological relationships. American Zoology 23: 411–425. https://doi.org.10.1093/icb/23.2.411

Waayers, D., Smith, L. and Malseed, B. 2011. Internesting distribution of green turtles (*Chelonia mydas*) and flatback turtles (*Natator depressus*) at the Lacepede Islands, Western Australia. Journal of the Royal Society of Western Australia 94: 359–364.

Weller, D.R and Lee, C.V. 2017. Migratory shorebird conservation action plan. BirdLife Australia, unpublished report, September 2017.

Whiting, S.D. 2000. The foraging ecology of juvenile green and hawksbill sea turtles in north-western Australia. PhD thesis, Northern Territory University, Darwin, NT.

Whiting, A.U., Thomson, A., Chaloupka, M. and Limpus, C.J. 2008. Seasonality, abundance and breeding biology of one of the largest populations of nesting flatback turtles: Cape Domett. Western Australia. Australian Journal of Zoology 56: 297-303.

Whitty, J.M., Phillips, N.M., Morgan, D.L., Chaplin, J.A., Thorburn, D.C. and Peverell, S.C. 2008. Habitat associations of Freshwater Sawfish (*Pristis microdon*) and Northern River Sharks (*Glyphis garricki*): including genetic analysis of freshwater sawfish across northern Australia. Report to Australian Government, Department of the Environment, Water, Heritage and the Arts. Murdoch University Centre for Fish and Fisheries Research. Perth, Western Australia. 75 pp.

Wijeratne, S. Pattiaratchi, C. and Proctor, R. 2018. Estimates of surface and subsurface boundary current transport around Australia. Journal of Geophysical Research: Oceans 123: 3444-3466.

Williamson, P.C., Sumner, N.R. and Malseed, B.E. 2006. A 12-month survey of recreational fishing in the Pilbara region of Western Australia during 1999-2000, Fisheries Research Report No. 153, Department of Fisheries, Western Australia. 61 pp.

Wilson, B.R. 2013. The biogeography of the Australian North West Shelf: Environmental Change and Life's Response. Western Australian Museum, Perth, Australia. 415 pp.

Wilson, S., Carleton, J. and Meekan, M. 2003. Spatial and temporal patterns in the distribution and abundance of macrozooplankton on the southern North West Shelf, Western Australia. Estuarine, Coastal and Shelf Science 56: 897–908.

Wilson, S.K., Depczynski, M. and Fisher, R. 2010. Habitat associations of juvenile fish at Ningaloo Reef, Western Australia: the importance of coral and algae. PLoS ONE 5(12): e15185. https://doi.org/10.1371/journal.pone.0015185

Woodside 2012. Eastern Flank – Preliminary Metocean Design and Operating Criteria. Controlled reference number A9650RT7964290. Woodside Energy Limited, Perth, Western Australia.

Woodside 2016. Vincent – basic design data specification sheet – metocean (No. V0000ST9650826). Woodside Energy Limited, Perth, Western Australia.

Woodside 2019. Proposed Browse to NWS Project Draft EIS/ERD. EPA Assessment No. 2191, EPBC 2018/8319. December 2019. 1986 pp.

Woodside 2020. Scarborough Offshore Project Proposal, Revision 5 Submission, February 2020. Woodside Energy Ltd. 806 pp.

Wynen. L., Larson, H., Thorburn, D., Peverell, S., Morgan, D., Field, I. and Gibb, K. 2009. Mitochondrial DNA supports the identification of two endangered river sharks (*Glyphis glyphis* and *Glyphis garricki*) across northern Australia. Marine and Freshwater Research 60: 554–562.

APPENDIX A. PROTECTED MATTER SEARCH REPORTS FOR NWMR, SWMR AND NMR

Australian Government

Department of Agriculture, Water and the Environment

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

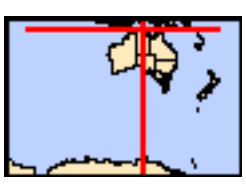
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 10/05/21 12:59:15

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental 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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	33
Listed Migratory Species:	70

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 http://www.environment.gov.au/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 Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	127
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	15

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	1
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	8

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 the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-	Vulnerable	Species or species

Name	Status	Type of Presence
tailed Godwit [86380]		habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
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
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Notomys aquilo Northern Hopping-mouse, Woorrentinta [123]	Endangered	Species or species habitat may occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Cryptoblepharus gurrmul Arafura Snake-eyed Skink [83106]	Endangered	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Congregation or aggregation known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat known to occur within area
Glyphis glyphis Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Foraging, feeding or related behaviour known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Congregation or aggregation known to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding likely to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Foraging, feeding or related behaviour known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding likely to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area
Fish		

Name	Threatened	Type of Presence
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Cosmocampus maxweberi Maxweber's Pipefish [66209]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus macrorhynchus Whiskered Pipefish, Ornate Pipefish [66222]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys parvicarinatus Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippichthys spicifer Belly-barred Pipefish, Banded Freshwater Pipefish [66232]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Hippocampus zebra Zebra Seahorse [66241]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Microphis brachyurus Short-tail Pipefish, Short-tailed River Pipefish [66257]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may 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
Aipysurus laevis Olive Seasnake [1120]		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	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Congregation or aggregation known 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
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis caerulescens Dwarf Seasnake [1103]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis gracilis Slender Seasnake [1106]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis melanosoma Black-banded Robust Seasnake [1109]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within area
Hydrophis vorisi a seasnake [25927]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Laticauda colubrina a sea krait [1092]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dophin, 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 simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area

Name	Status	Type of Presence
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Name	Label
Arafura	Multiple Use Zone (IUCN VI)
Arafura	Special Purpose Zone (Trawl) (IUCN VI)
Arnhem	Special Purpose Zone (IUCN VI)
Gulf of Carpentaria	National Park Zone (IUCN II)
Gulf of Carpentaria	Special Purpose Zone (Trawl) (IUCN VI)
Joseph Bonaparte Gulf	Multiple Use Zone (IUCN VI)

Name	Label
Joseph Bonaparte Gulf	Special Purpose Zone (IUCN VI)
Limmen	Habitat Protection Zone (IUCN IV)
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)
Wessel	Habitat Protection Zone (IUCN IV)
Wessel	Special Purpose Zone (Trawl) (IUCN VI)
West Cape York	Habitat Protection Zone (IUCN IV)
West Cape York	National Park Zone (IUCN II)
West Cape York	Special Purpose Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Anindilyakwa	NT
Marthakal	NT

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Southern Gulf Aggregation	QLD

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Van	North
Gulf of Carpentaria basin	North
Gulf of Carpentaria coastal zone	North
Pinnacles of the Bonaparte Basin	North
Plateaux and saddle north-west of the Wellesley	North
Shelf break and slope of the Arafura Shelf	North
Submerged coral reefs of the Gulf of Carpentaria	North
Tributary Canyons of the Arafura Depression	North

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

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 Act 1999. It holds 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 and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making 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 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 distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

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 as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- 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:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-14.758882 129.178077,-13.960657 128.826514,-13.768665 128.606788,-12.484784 128.496924,-11.183724 127.563087,-10.460737 128.233253,-9.746889 129.518653,-9.660256 130.254737,-9.779371 130.935889,-9.280976 132.528907,-8.901286 133.385841,-9.411062 134.858008,-9.129149 135.473243,-10.363488 138.582374,-11.129831 139.395362,-10.190527 141.339942,-10.806262 141.317969,-10.817053 141.922217,-11.10827 142.087012,-12.527687 141.559669,-13.330764 141.515723,-13.960657 141.40586,-15.045535 141.570655,-15.945419 141.317969,-17.22994 140.823585,-17.513041 140.53794,-17.659661 140.032569,-17.429205 139.593116,-16.630864 139.966651,-16.409675 139.812842,-16.177683 139.208594,-16.820251 138.966895,-15.924291 137.165137,-15.575354 137.132178,-15.458909 136.934424,-15.289418 136.11045,-14.822615 135.45127,-14.269641 135.846778,-14.418655 136.97837,-13.608551 137.011329,-12.784952 136.780616,-12.388227 137.055274,-10.957305 136.76963,-10.957305 136.703712,-11.399198 136.407081,-11.679068 135.824805,-11.904912 135.616065,-11.947909 134.473487,-11.679068 133.869239,-11.700585 133.50669,-11.431505 133.528663,-11.442273 133.363868,-11.64679 133.254005,-11.313028 132.979346,-11.04358 133.067237,-10.90337 132.583839,-11.151389 131.221534,-11.3238 130.782081,-11.054363 130.287696,-11.474575 130.111915,-11.765126 129.958106,-11.947909 130.067969,-11.894162 130.760108,-12.119827 130.913917,-12.441874 130.474464,-12.870649 130.100928,-13.939333 129.584571,-13.971319 129.419776,-14.47185 129.28794,-14.631358 129.507667,-14.843856 129.452735,-14.769505 129.178077,-14.758882 129.178077

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.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

Australian Government

Department of Agriculture, Water and the Environment

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

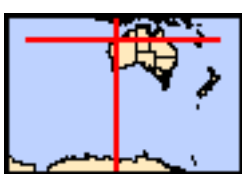
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 10/05/21 13:07:00

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	5
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	70
Listed Migratory Species:	84

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/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 Land:	None
Commonwealth Heritage Places:	1
Listed Marine Species:	149
Whales and Other Cetaceans:	34
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	17

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	10
Regional Forest Agreements:	None
Invasive Species:	23
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	5

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
Shark Bay, Western Australia	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
Shark Bay, Western Australia	WA	Listed place
The Ningaloo Coast	WA	Listed place
The West Kimberley	WA	Listed place
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Historic		
Dirk Hartog Landing Site 1616 - Cape Inscription Area	WA	Listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Eighty-mile beach	Within Ramsar site
Ord river floodplain	Within 10km of Ramsar

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 the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North-west

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Geophaps smithii blaauwi Partridge Pigeon (western) [66501]	Vulnerable	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Malurus leucopterus leucopterus White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren [26004]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur lesueur Burrowing Bettong (Shark Bay), Boodie [66659]	Vulnerable	Species or species habitat likely to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Isoodon auratus auratus Golden Bandicoot (mainland) [66665]	Vulnerable	Species or species habitat likely to occur within area
Lagostrophus fasciatus fasciatus Banded Hare-wallaby, Merrnine, Marnine, Munning [66664]	Vulnerable	Translocated population known to occur within area
Leporillus conditor Wopilkara, Greater Stick-nest Rat [137]	Vulnerable	Translocated population known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Perameles bougainville bougainville Western Barred Bandicoot (Shark Bay) [66631]	Endangered	Translocated population known to occur within area
Petrogale concinna monastria Nabarlek (Kimberley) [87607]	Endangered	Species or species habitat known to occur within area
Phascogale tapoatafa kimberleyensis Kimberley brush-tailed phascogale, Brush-tailed Phascogale (Kimberley) [88453]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat may occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Reptiles		
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	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Lerista nevinae Nevin's Slider [85296]	Endangered	Species or species habitat known to occur within area
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat known to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Foraging, feeding or related behaviour likely to occur within area
Sterna dougallii Roseate Tern [817]		Breeding likely to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur

Name	Threatened	Type of Presence
		within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area

Migratory Terrestrial Species	
Cecropis daurica Red-rumped Swallow [80610]	Species or species habitat may occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]	Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]	Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]	Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]	Species or species habitat likely to occur within area

Migratory Wetlands Species	
Acrocephalus orientalis Oriental Reed-Warbler [59570]	Species or species habitat may occur within area
Actitis hypoleucos Common Sandpiper [59309]	Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Heritage Places		[Resource Information]
Name	State	Status
Natural		
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres		
Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba		
Sanderling [875]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Foraging, feeding or related behaviour likely to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding likely to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
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

Name	Threatened	Type of Presence
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
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
Mammals		
Dugong dugon Dugong [28]		Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Reptiles		
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

Name	Threatened	Type of Presence
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 pooleorum Shark Bay Seasnake [66061]		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	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known 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
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hydrophis czeblukovi Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species

Name	Status	Type of Presence
		habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Abrolhos	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Special Purpose Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	National Park Zone (IUCN II)
Dampier	Habitat Protection Zone (IUCN IV)
Dampier	Multiple Use Zone (IUCN VI)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)
Gascoyne	National Park Zone (IUCN II)
Joseph Bonaparte Gulf	Multiple Use Zone (IUCN VI)
Kimberley	Multiple Use Zone (IUCN VI)
Ningaloo	Recreational Use Zone (IUCN IV)
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Roebuck	Multiple Use Zone (IUCN VI)
Shark Bay	Multiple Use Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Bardi Jawi	WA
Dambimangari	WA
Dambimangari	WA
Dirk Hartog Island	WA
Faure Island	WA
Little Rocky Island	WA
Tent Island	WA
Unnamed WA36913	WA
Unnamed WA36915	WA
Uunguu	WA

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Exmouth Gulf East	WA
Hamelin Pool	WA
Shark Bay East	WA

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Sahul	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Pinnacles of the Bonaparte Basin	North-west
Wallaby Saddle	North-west

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

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 Act 1999. It holds 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 and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making 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 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 distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

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 as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- 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:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-11.269933 127.440005,-12.516962 128.274966,-13.416271 128.362857,-13.854015 128.406802,-14.652617 128.879214,-14.833236 128.956119,-14.737633 128.439761,-14.280288 127.769595,-13.864681 127.385074,-13.864681 127.143375,-13.67261 126.934634,-13.875347 126.418277,-13.843348 126.242496,-13.896678 125.967837,-14.077907 125.934878,-14.34416 125.836001,-14.216398 125.649234,-14.461212 125.099918,-14.641988 125.044986,-14.88633 125.143863,-14.971254 124.990054,-15.257624 124.649478,-15.268222 124.231998,-15.416549 124.16608,-15.490673 124.407779,-16.293713 124.286929,-16.072142 123.616763,-16.219884 123.429996,-16.567693 123.408023,-16.778181 123.561832,-16.914874 123.704654,-17.114478 123.397037,-16.546631 123.034488,-16.251529 123.078433,-16.704537 122.540103,-17.135476 122.144595,-17.502564 122.056705,-18.244939 122.078677,-18.432649 121.738101,-18.76585 121.551334,-19.45099 121.100894,-19.999097 119.584781,-19.906155 119.101382,-20.236365 118.727847,-20.308506 118.112613,-20.648142 117.321597,-20.555589 116.948062,-20.360014 117.01398,-20.318809 116.816226,-20.802273 116.26691,-20.822812 116.113101,-21.468342 115.377017,-21.754335 114.629947,-22.344932 114.355289,-22.202601 114.146548,-21.67268 114.245425,-21.886924 113.849918,-22.669716 113.586246,-23.003846 113.751041,-23.458145 113.696109,-24.031352 113.300601,-24.51208 113.311587,-25.893759 114.135562,-26.258875 114.003726,-25.953045 113.926822,-25.398562 113.45441,-25.686027 113.366519,-26.249022 113.641177,-26.229314 113.509341,-25.378711 112.949039,-25.557248 112.839175,-26.485263 113.256656,-27.161748 113.816959,-27.571531 114.036685,-27.552052 113.113834,-27.151972 112.981998,-25.368784 112.278873,-26.022173 110.389224,-25.893759 110.323306,-25.804776 109.872867,-25.537424 109.587222,-25.626608 109.23566,-24.582033 109.389468,-23.306884 109.872867,-22.882439 110.026675,-21.621623 110.169498,-20.945986 110.510074,-20.030065 110.949527,-19.025706 112.092105,-17.816621 112.981998,-17.271909 113.773013,-16.935895 115.442935,-15.681156 116.014224,-14.790751 116.89313,-14.056594 118.266421,-13.266614 118.42023,-13.949995 120.046207,-13.234532 121.825992,-12.838516 122.529117,-12.15205 122.51813,-11.883411 122.726871,-11.786636 123.067447,-11.926411 123.440982,-12.248693 123.583804,-11.63603 125.737125,-11.334573 126.539126,-11.280707 127.440005,-11.269933 127.440005

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.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

Australian Government

Department of Agriculture, Water and the Environment

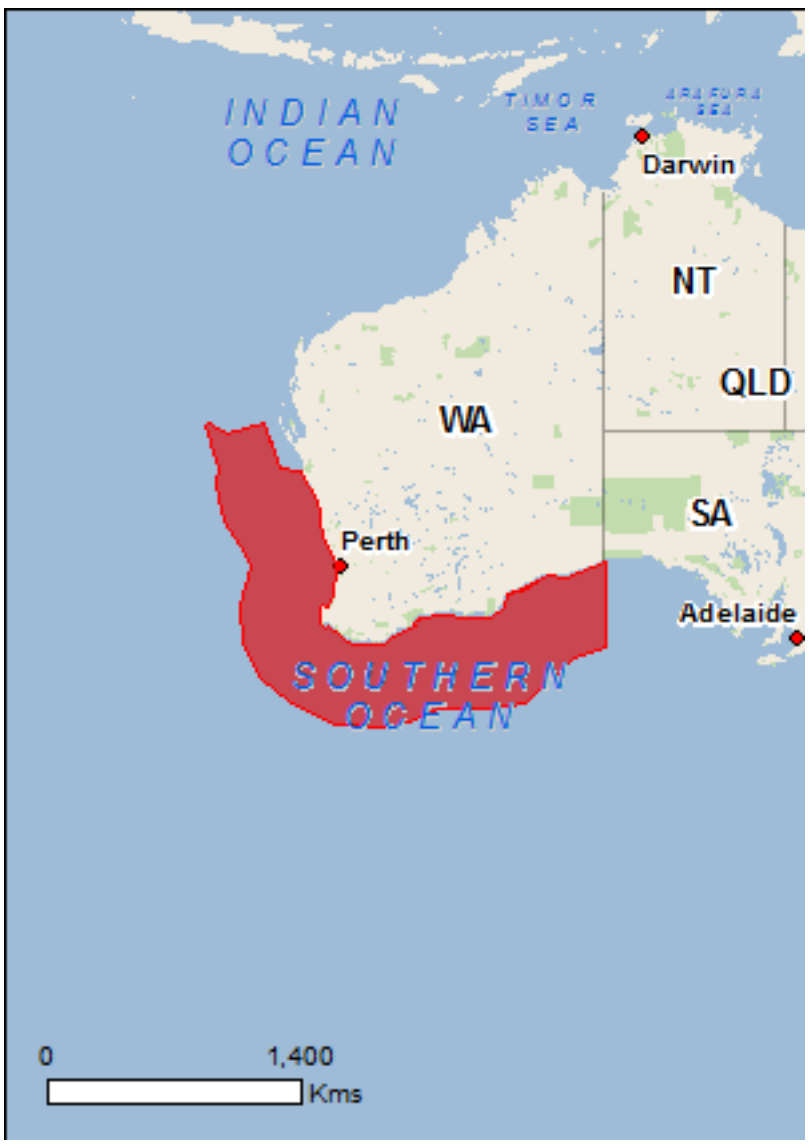
EPBC Act Protected Matters Report

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

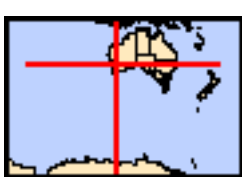
Report created: 10/05/21 12:51:00



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	65
Listed Migratory Species:	67

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 http://www.environment.gov.au/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 Land:	2
Commonwealth Heritage Places:	1
Listed Marine Species:	106
Whales and Other Cetaceans:	40
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	21

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	10
Regional Forest Agreements:	None
Invasive Species:	42
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	8

Details

Matters of National Environmental Significance

National Heritage Properties [Resource Information]

Name	State	Status
Indigenous		
Cheetup Rock Shelter	WA	Listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Becher point wetlands	Within 10km of Ramsar
Forrestdale and thomsons lakes	Within 10km of Ramsar
Peel-yalgorup system	Within 10km of Ramsar
Vasse-wonnerup system	Within 10km of Ramsar

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 the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-west

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community may occur within area
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Community may occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Atrichornis clamosus		
Noisy Scrub-bird, Tjimiluk [654]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel	Endangered	Species or species

Name	Status	Type of Presence
[1060]		habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pezoporus flaviventris Western Ground Parrot, Kyloring [84650]	Critically Endangered	Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat known to occur within area
Petrogale lateralis hacketti Recherche Rock-wallaby [66849]	Vulnerable	Species or species habitat known to occur within area
Potorous gilbertii Gilbert's Potoroo, Ngilkat [66642]	Critically Endangered	Translocated population known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat may occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area
Plants		
Caladenia elegans Elegant Spider-orchid [56775]	Endangered	Species or species habitat may occur within area
Caladenia granitora [65292]	Endangered	Species or species habitat may occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Drummondita ericoides Morseby Range Drummondita [9193]	Endangered	Species or species habitat likely to occur within area
Eucalyptus insularis Twin Peak Island Mallee [3057]	Endangered	Species or species habitat likely to occur within area
Isopogon uncinatus Albany Cone Bush, Hook-leaf Isopogon [20871]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Status	Type of Presence
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Egernia stokesii badia		
Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat may occur within area
Liopholis pulchra longicauda		
Jurien Bay Skink, Jurien Bay Rock-skink [83162]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea		
Sooty Shearwater [82651]		Species or species habitat may occur within area
Ardenna pacifica		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris		
Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea amsterdamensis		
Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena		
Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
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
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN ISLAND

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Garden Island	WA	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres		
Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris alba		
Sanderling [875]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area

Name	Threatened	Type of Presence
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Breeding known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Breeding known to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		

Name	Threatened	Type of Presence
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptiles		
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour 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]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii		
Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata		
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Breeding known to occur within area
Feresa attenuata		
Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus		
Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas		
Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Abrolhos	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Special Purpose Zone (IUCN VI)
Bremer	National Park Zone (IUCN II)
Bremer	Special Purpose Zone (Mining
Eastern Recherche	National Park Zone (IUCN II)
Eastern Recherche	Special Purpose Zone (IUCN VI)
Geographe	Habitat Protection Zone (IUCN IV)
Geographe	Multiple Use Zone (IUCN VI)
Geographe	National Park Zone (IUCN II)
Geographe	Special Purpose Zone (Mining
Great Australian Bight	Special Purpose Zone (Mining
Jurien	Special Purpose Zone (IUCN VI)
South-west Corner	Habitat Protection Zone (IUCN IV)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	National Park Zone (IUCN II)
South-west Corner	Special Purpose Zone (IUCN VI)
South-west Corner	Special Purpose Zone (Mining
Twilight	National Park Zone (IUCN II)
Twilight	Special Purpose Zone (Mining
Two Rocks	Multiple Use Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Bald Island	WA
Boullanger, Whitlock, Favourite, Tern And Osprey Islands	WA
Eclipse Island	WA
Escape Island	WA
Flinders Bay	WA
Penguin Island	WA
Recherche Archipelago	WA
St Alouarn Island	WA
Unnamed WA44682	WA
Unnamed WA48968	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Key Ecological Features (Marine)

[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 90-120m depth	South-west
Commonwealth marine environment surrounding	South-west
Commonwealth marine environment within and	South-west
Commonwealth marine environment within and	South-west
Diamantina Fracture Zone	South-west
Naturaliste Plateau	South-west
Western demersal slope and associated fish	South-west
Western rock lobster	South-west

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

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 Act 1999. It holds 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 and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making 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 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 distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

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 as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- 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:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-25.765206 109.237891,-25.725623 109.501563,-25.992551 109.732276,-25.992551 109.875098,-26.071525 110.182716,-26.229314 110.325538,-25.656321 112.127296,-27.717513 112.984229,-27.814726 114.02793,-28.202708 114.159766,-28.483117 114.445411,-28.695347 114.577247,-28.974447 114.599219,-29.147305 114.818946,-29.530391 114.950782,-29.921554 114.89585,-30.746498 115.082618,-31.517621 115.533057,-31.863505 115.730811,-32.523601 115.67588,-32.634692 115.544044,-33.16049 115.620948,-33.619137 115.302344,-33.49096 114.994727,-33.737988 114.928809,-34.275319 114.972755,-34.46575 115.126563,-34.366055 115.269385,-34.818257 115.917579,-34.908402 116.060401,-35.106373 116.598731,-35.11536 117.389747,-35.169263 117.774268,-35.169263 118.081885,-34.980447 118.312598,-34.402321 119.663917,-34.30255 119.56504,-34.029844 119.883643,-33.938746 120.960303,-33.911398 121.399757,-34.011632 121.949073,-34.102652 122.476417,-34.038948 123.432227,-33.591687 124.091407,-33.10529 124.212257,-32.902593 125.014258,-32.319576 126.134864,-32.375265 127.123633,-31.760809 129.035255,-35.294897 129.068214,-35.634921 127.541114,-37.453004 125.157081,-37.696807 123.058692,-37.688114 120.817481,-38.46644 118.664161,-38.337294 115.697852,-37.418109 113.368751,-36.584603 112.028419,-34.998448 111.061622,-33.545916 110.973731,-31.984725 111.512061,-31.414542 111.270362,-30.026241 110.182716,-28.396173 109.798194,-27.756409 109.875098,-25.765206 109.237891,-25.765206 109.237891

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.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

APPENDIX B. SUPPORTING FIGURES FOR SECTION 2.3 METEOROLOGY AND OCEANOGRAPHY

Browse

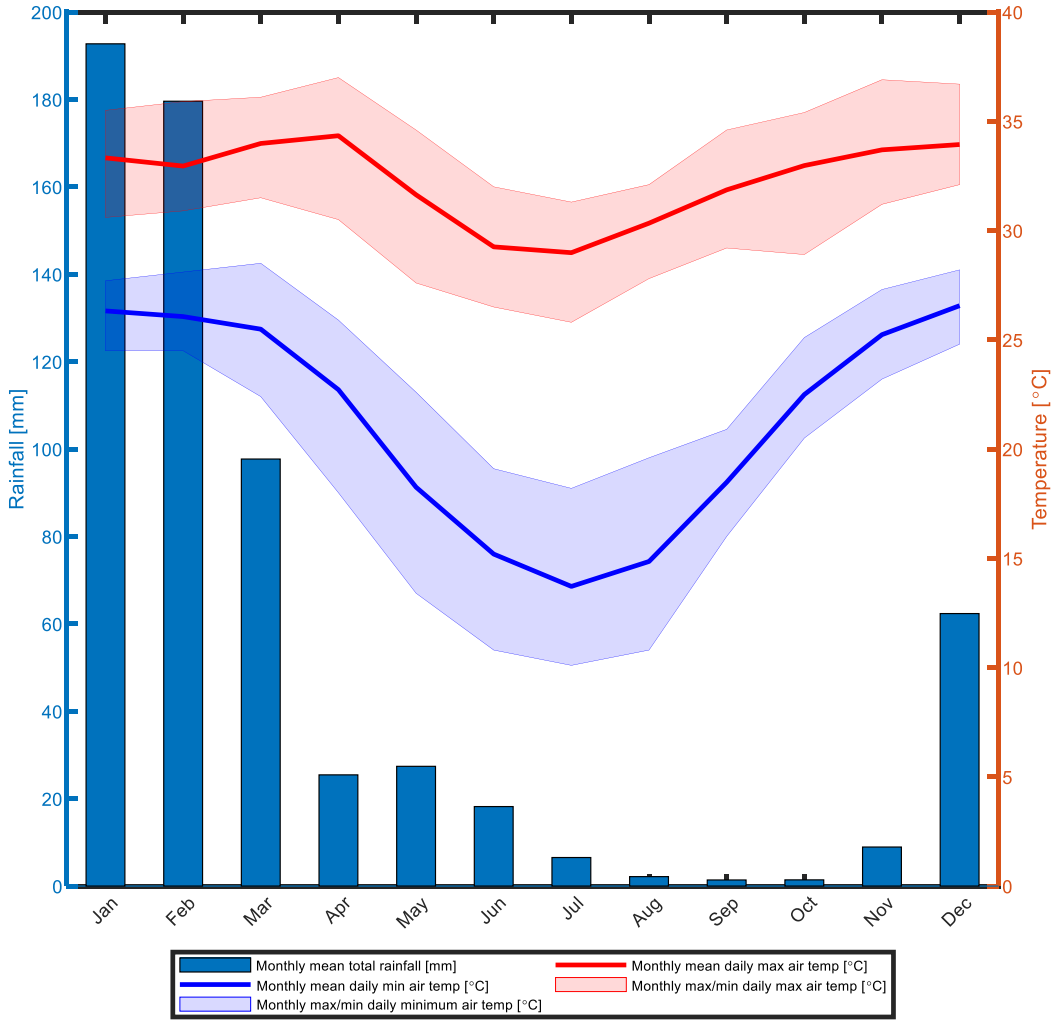


Figure 1. Monthly average total rainfall [mm] and air temperature [°C], calculated based on observations at the Broome Airport weather station from 1939-2020 (Bureau of Meteorology 2020). Bars show the monthly average total rainfall values, and thick blue and red lines denote monthly average daily minimum and maximum air temperatures, respectively. Shaded blue and red areas denote monthly recorded extremes of daily minimum and maximum air temperature, respectively.

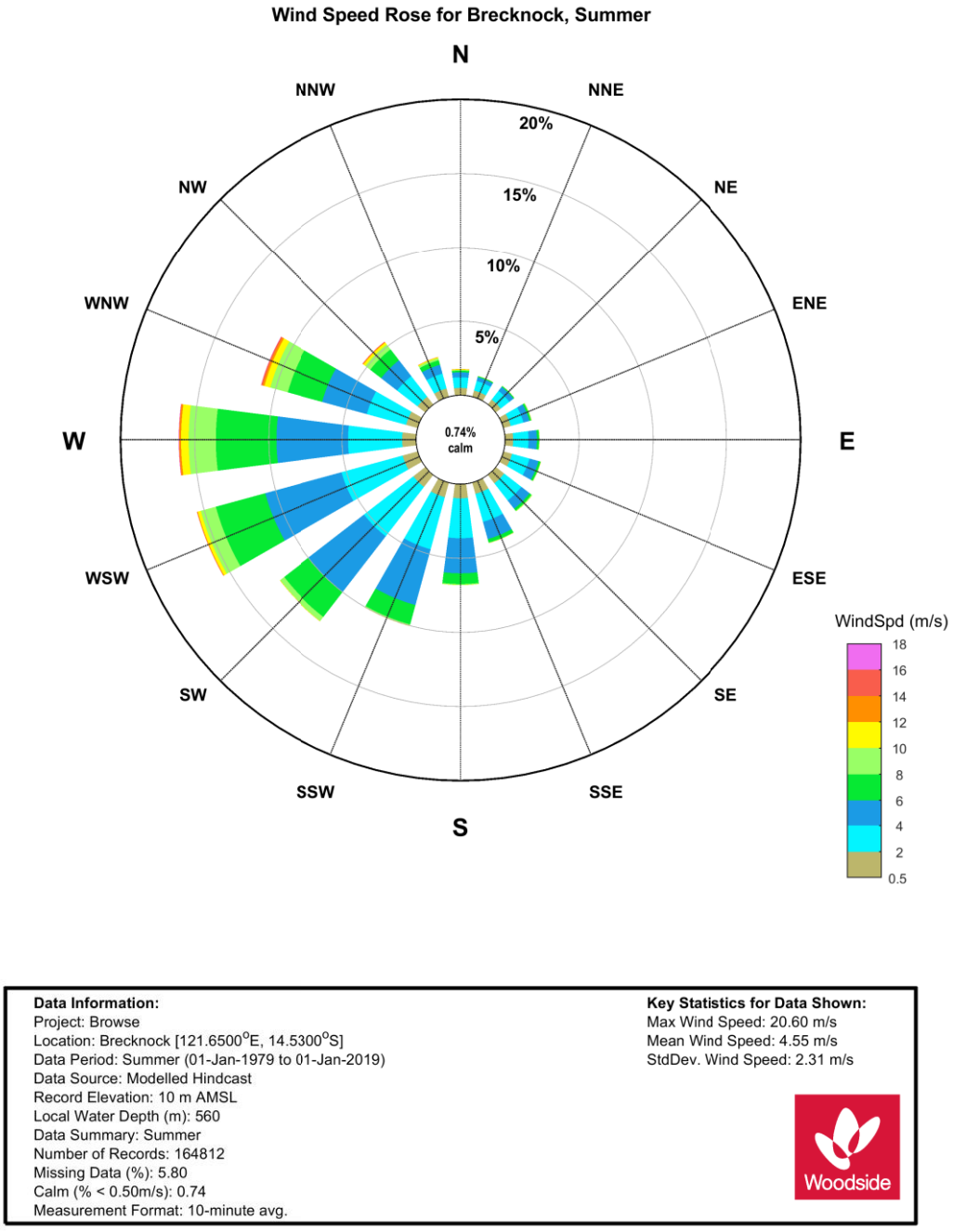
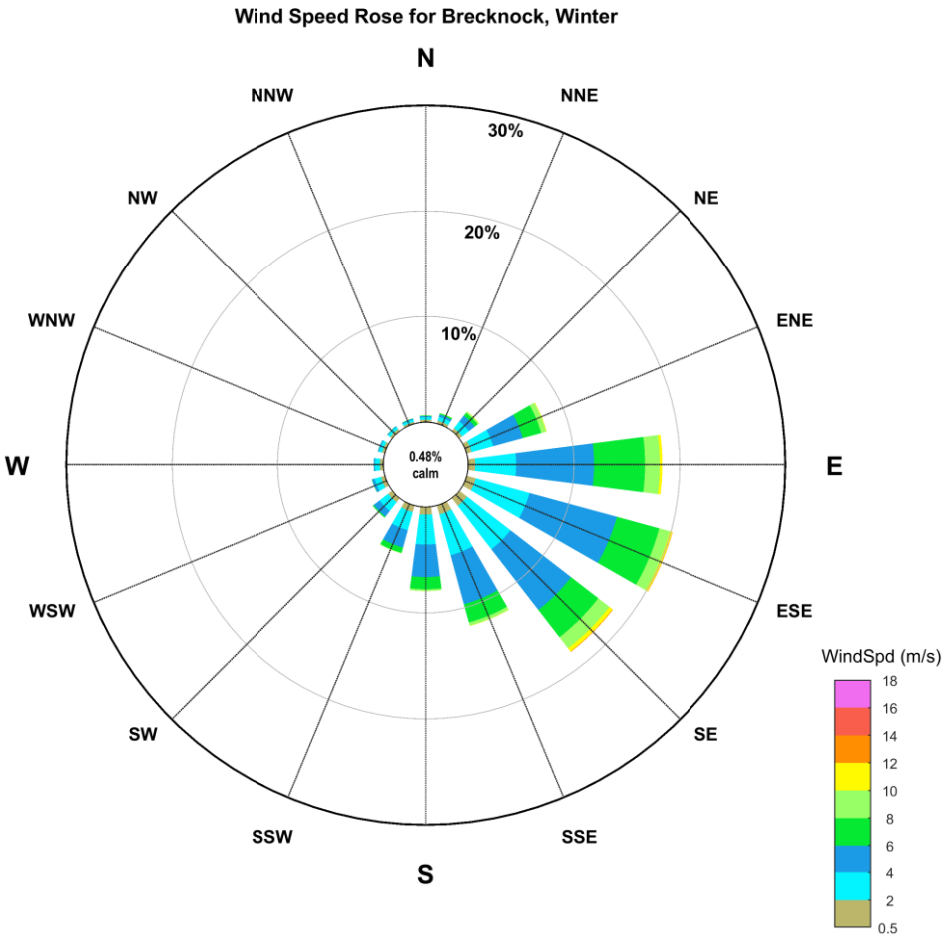


Figure 2. Summer distributions of 10-minute average wind speeds by 22.5° directional sectors at the Brecknock site (Metocean Solutions Ltd, 2019). Note tropical cyclone events were not included in this distribution. Winds at Brecknock in summer are predominantly from the WNW to SW due to the North West Monsoon (WEL, 2019).



Data Information:
Project: Browse
Location: Brecknock [121.6500°E, 14.5300°S]
Data Period: Winter (01-Apr-1979 to 30-Sep-2018)
Data Source: Modelled Hindcast
Record Elevation: 10 m AMSL
Local Water Depth (m): 560
Data Summary: Winter
Number of Records: 173751
Missing Data (%): 1.10
Calm (% < 0.50m/s): 0.48
Measurement Format: 10-minute avg.

Key Statistics for Data Shown:
Max Wind Speed: 14.34 m/s
Mean Wind Speed: 4.71 m/s
StdDev. Wind Speed: 2.01 m/s

Woodside

Figure 3. Winter distributions of 10-minute average wind speeds by 22.5° directional sectors at the Brecknock site (Metocean Solutions Ltd, 2019). Note tropical cyclone events were not included in this distribution. Winds at Brecknock in winter are predominantly from the E to SE due to the South East Trade Winds coming from the Australian mainland (WEL, 2019).

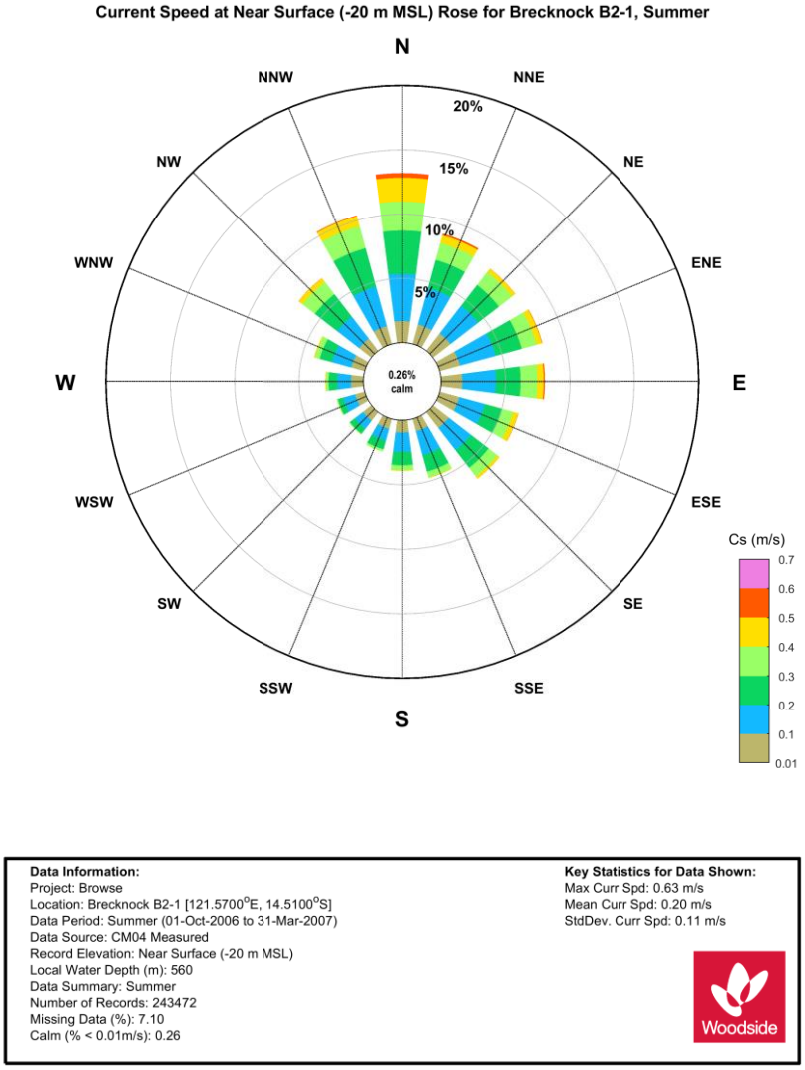
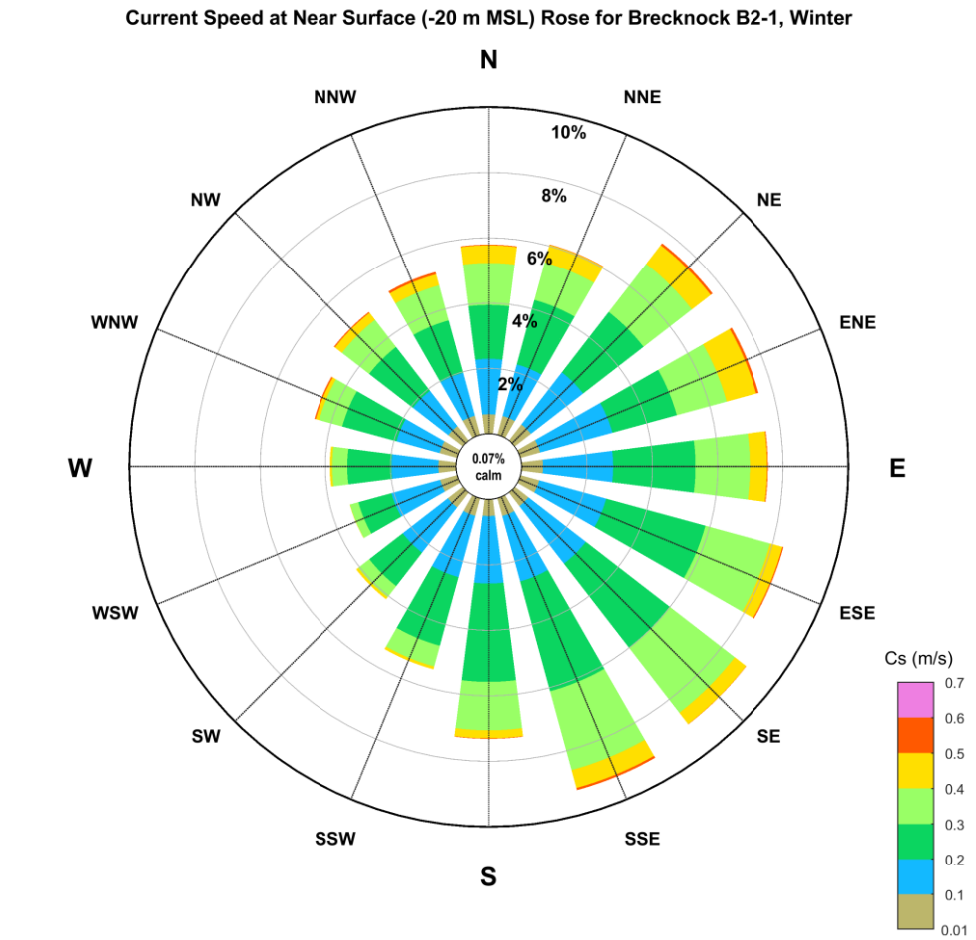


Figure 4. Summer (Nov-Apr) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at Brecknock B2-1 location (cyclones removed) (RPS Metocean Ltd. 2008).



Data Information:
Project: Browse
Location: Brecknock B2-1 [121.5700°E, 14.5100°S]
Data Period: Winter (17-Sep-2006 to 08-Sep-2007)
Data Source: CM04 Measured
Record Elevation: Near Surface (-20 m MSL)
Local Water Depth (m): 560
Data Summary: Winter
Number of Records: 246184
Missing Data (%): 1.46
Calm (% < 0.01m/s): 0.07

Key Statistics for Data Shown:
Max Curr Spd: 0.62 m/s
Mean Curr Spd: 0.24 m/s
StdDev. Curr Spd: 0.10 m/s

Woodside

Figure 5. Winter (May-Sep) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at Brecknock B2-1 location (cyclones removed) (RPS Metocean Ltd. 2008).

North-west Shelf/Scarborough

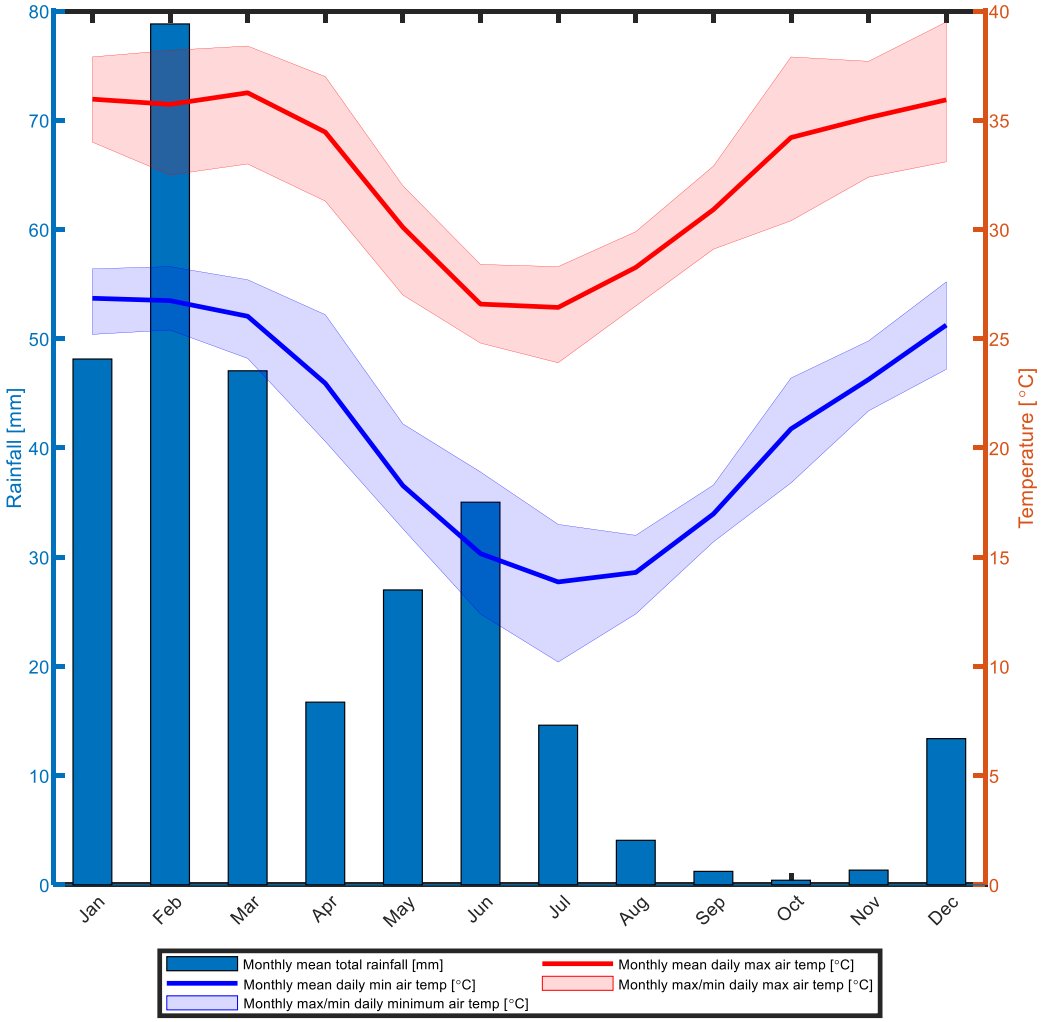
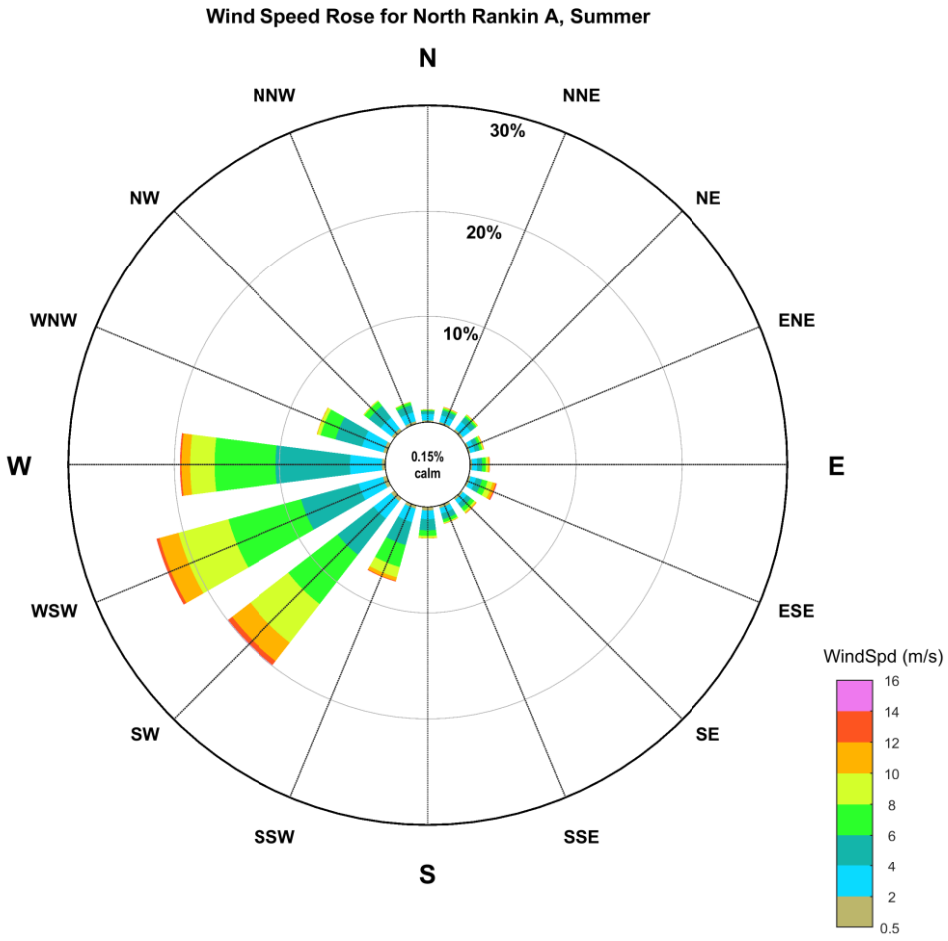


Figure 1. Monthly average total rainfall [mm] and air temperature [°C], calculated based on observations at the Karratha Aero weather station from 1972-2020 and 1993-2020 respectively (Bureau of Meteorology 2020). Bars show the monthly average total rainfall values, and thick blue and red lines denote monthly average daily minimum and maximum air temperatures, respectively. Shaded blue and red areas denote monthly recorded extremes of daily minimum and maximum air temperature, respectively.

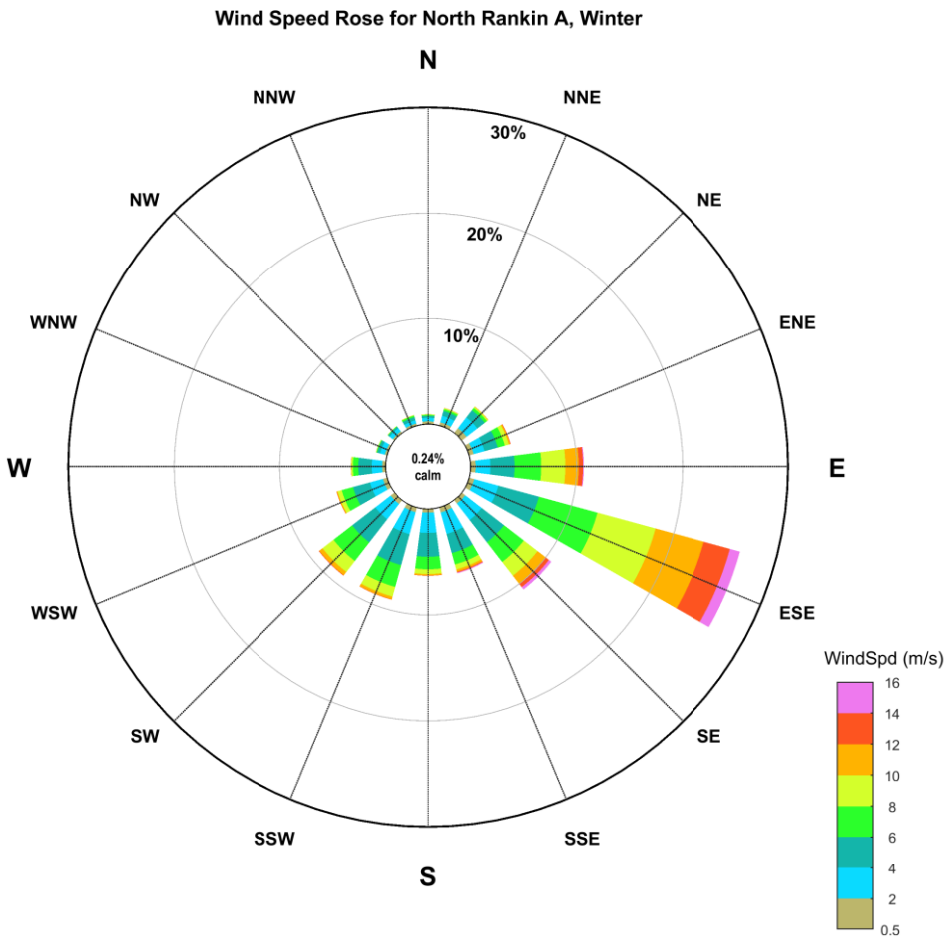


Data Information:
Project: North West Shelf
Location: North Rankin A [116.1200°E, 19.6100°S]
Data Period: Summer (01-Oct-1995 to 30-Nov-2015)
Data Source: Measured Winds
Record Elevation: 10 m AMSL
Local Water Depth (m): 125
Data Summary: Summer
Number of Records: 674659
Missing Data (%): 7.24
Calm (% < 0.50m/s): 0.15
Measurement Format: 10-minute avg.

Key Statistics for Data Shown:
Max Wind Speed: 18.50 m/s
Mean Wind Speed: 6.04 m/s
StdDev. Wind Speed: 2.55 m/s

Woodside

Figure 2. Summer distributions of 10-minute average wind speeds by 22.5° directional sectors at the North Rankin A site (WEL, 2015). Note tropical cyclone events were not included in this distribution. Winds at North Rankin A in summer are characterised by W to SW driven by the North West Monsoon (RPS, 2016).



Data Information:
Project: North West Shelf
Location: North Rankin A [116.1200°E, 19.6100°S]
Data Period: Winter (22-Jun-1995 to 30-Sep-2015)
Data Source: Measured Winds
Record Elevation: 10 m AMSL
Local Water Depth (m): 125
Data Summary: Winter
Number of Records: 673213
Missing Data (%): 4.43
Calm (% < 0.50m/s): 0.24
Measurement Format: 10-minute avg.

Key Statistics for Data Shown:
Max Wind Speed: 24.23 m/s
Mean Wind Speed: 6.25 m/s
StdDev. Wind Speed: 3.16 m/s

Woodside

Figure 3. Winter distributions of 10-minute average wind speeds by 22.5° directional sectors at the North Rankin A site (WEL, 2015). Note tropical cyclone events were not included in this distribution. Winds at North Rankin in winter are predominantly influenced by the South East Trade Winds over Australia (RPS, 2016).

Scarborough

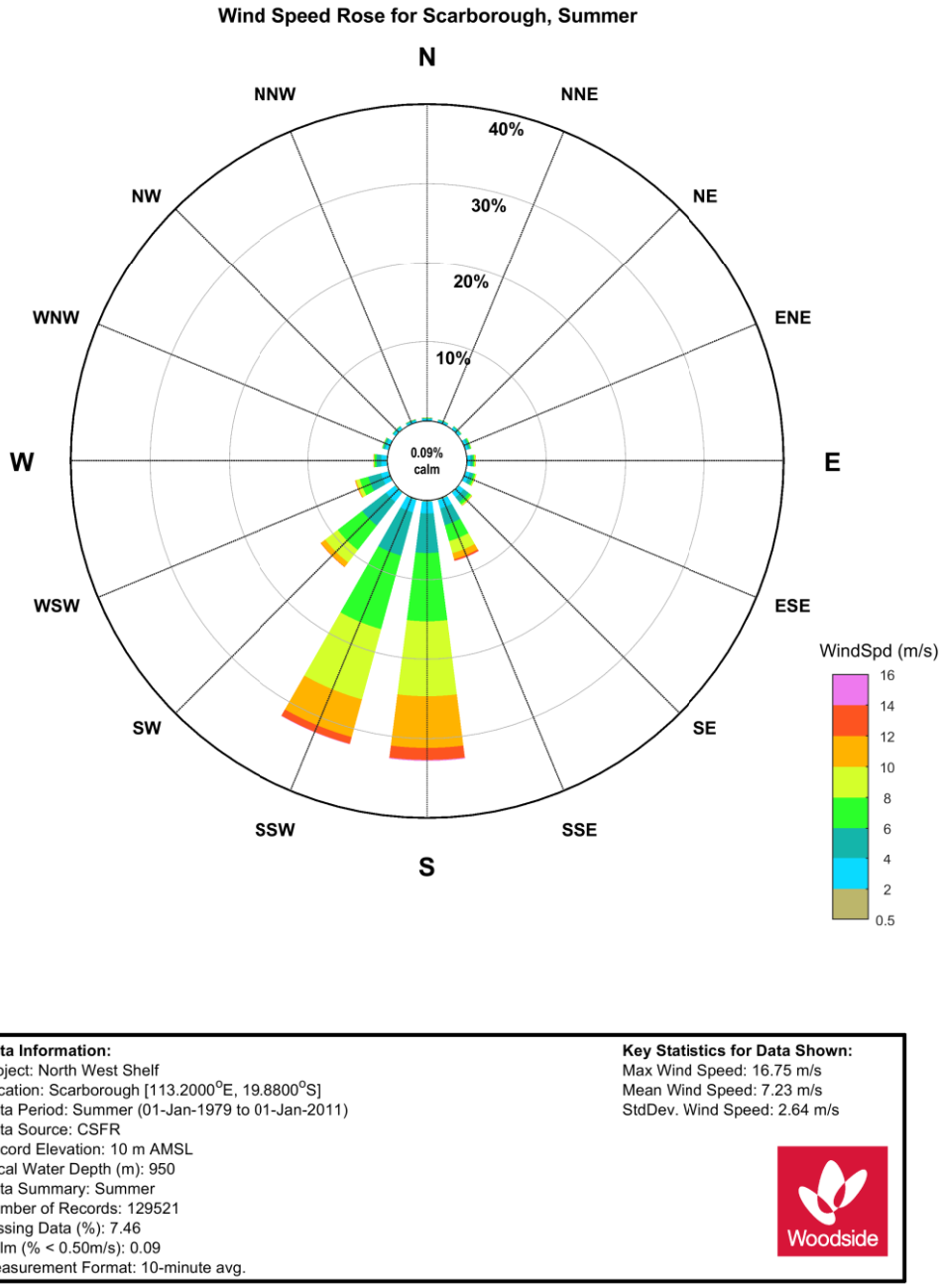
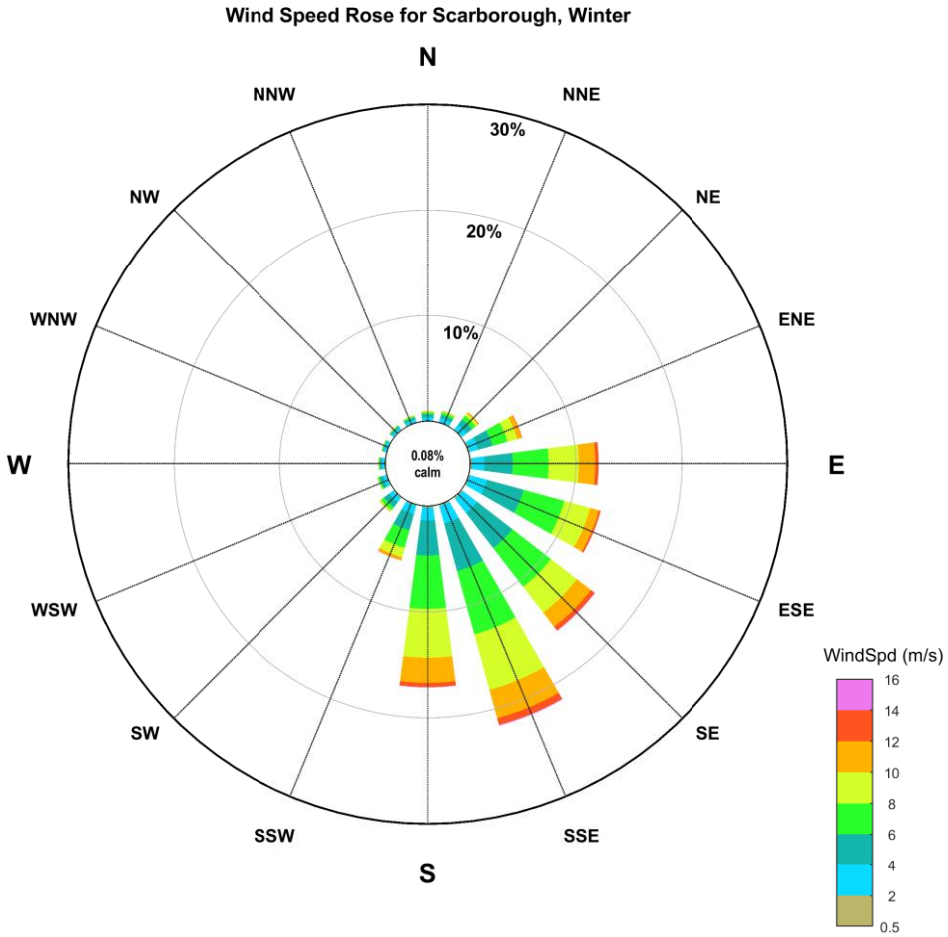


Figure 4. Summer distributions of wind speeds (10-minute at 10m ASL) by 22.5° directional sectors at the Scarborough site (WEL, 2018). Note tropical cyclone events were not included in this distribution. Winds at Scarborough in summer are predominantly from the S to SSW due to a Pilbara Heat Low forming over the northwest coast of Western Australia [R8] SW winds are also experienced at this site due to the monsoon trough.



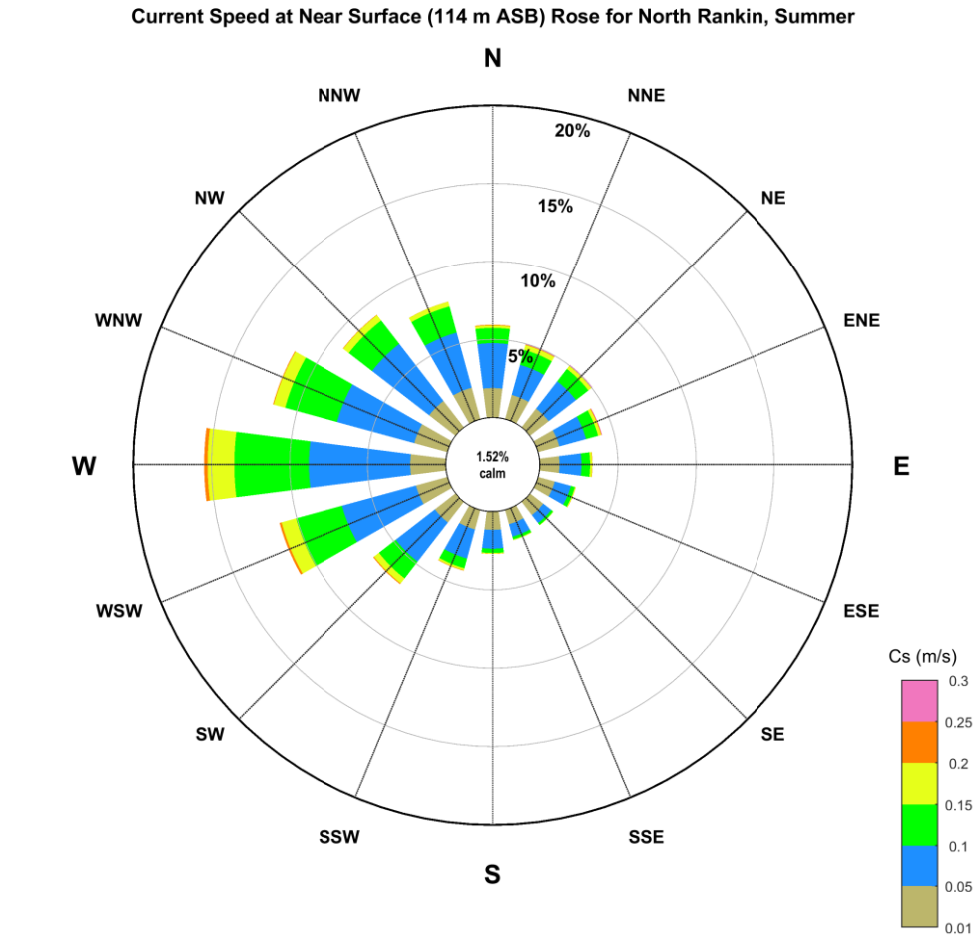
Data Information:
Project: North West Shelf
Location: Scarborough [113.2000°E, 19.8800°S]
Data Period: Winter (01-Apr-1979 to 30-Sep-2010)
Data Source: CSFR
Record Elevation: 10 m AMSL
Local Water Depth (m): 950
Data Summary: Winter
Number of Records: 138863
Missing Data (%): 1.20
Calm (% < 0.50m/s): 0.08
Measurement Format: 10-minute avg.

Key Statistics for Data Shown:
Max Wind Speed: 19.15 m/s
Mean Wind Speed: 6.90 m/s
StdDev. Wind Speed: 2.57 m/s

Woodside

Figure 5. Winter distributions of wind speeds (10-minute at 10 m ASL) by 22.5° directional sectors at the Scarborough site (WEL, 2018). Note tropical cyclone events were not included in this distribution. Winds at Scarborough in winter are predominantly from the S to E driven by the South East Trade Winds over Australia (RPS, 2016).

North-west Shelf

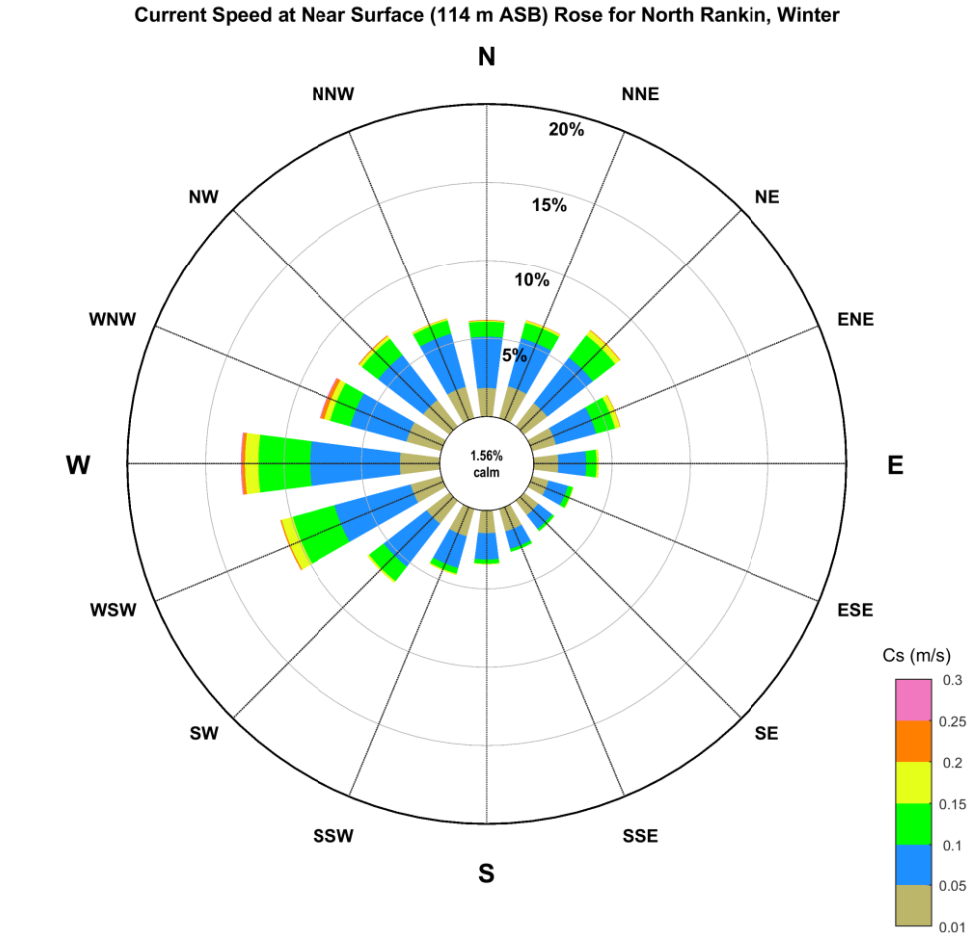


Data Information:
Project: North West Shelf
Location: North Rankin [116.1400°E, 19.5800°S]
Data Period: Summer (01-Oct-2004 to 31-Mar-2009)
Data Source: Measured Data
Record Elevation: Near Surface (114 m ASB)
Local Water Depth (m): 124.5
Data Summary: Summer
Number of Records: 496705
Missing Data (%): 6.63
Calm (% < 0.01m/s): 1.52

Key Statistics for Data Shown:
Max Curr Spd: 0.49 m/s
Mean Curr Spd: 0.08 m/s
StdDev. Curr Spd: 0.04 m/s

Woodside

Figure 6. Summer (Nov-Apr) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the North Rankin location (cyclones removed) (WEL, 2011).



Data Information:
Project: North West Shelf
Location: North Rankin [116.1400°E, 19.5800°S]
Data Period: Winter (21-Sep-2004 to 08-May-2009)
Data Source: Measured Data
Record Elevation: Near Surface (114 m ASB)
Local Water Depth (m): 124.5
Data Summary: Winter
Number of Records: 337723
Missing Data (%): 0.88
Calm (% < 0.01m/s): 1.56

Key Statistics for Data Shown:
Max Curr Spd: 0.32 m/s
Mean Curr Spd: 0.07 m/s
StdDev. Curr Spd: 0.04 m/s

Woodside

Figure 7. Winter (May-Sep) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the North Rankin location (cyclones removed) (WEL, 2011).

Scarborough

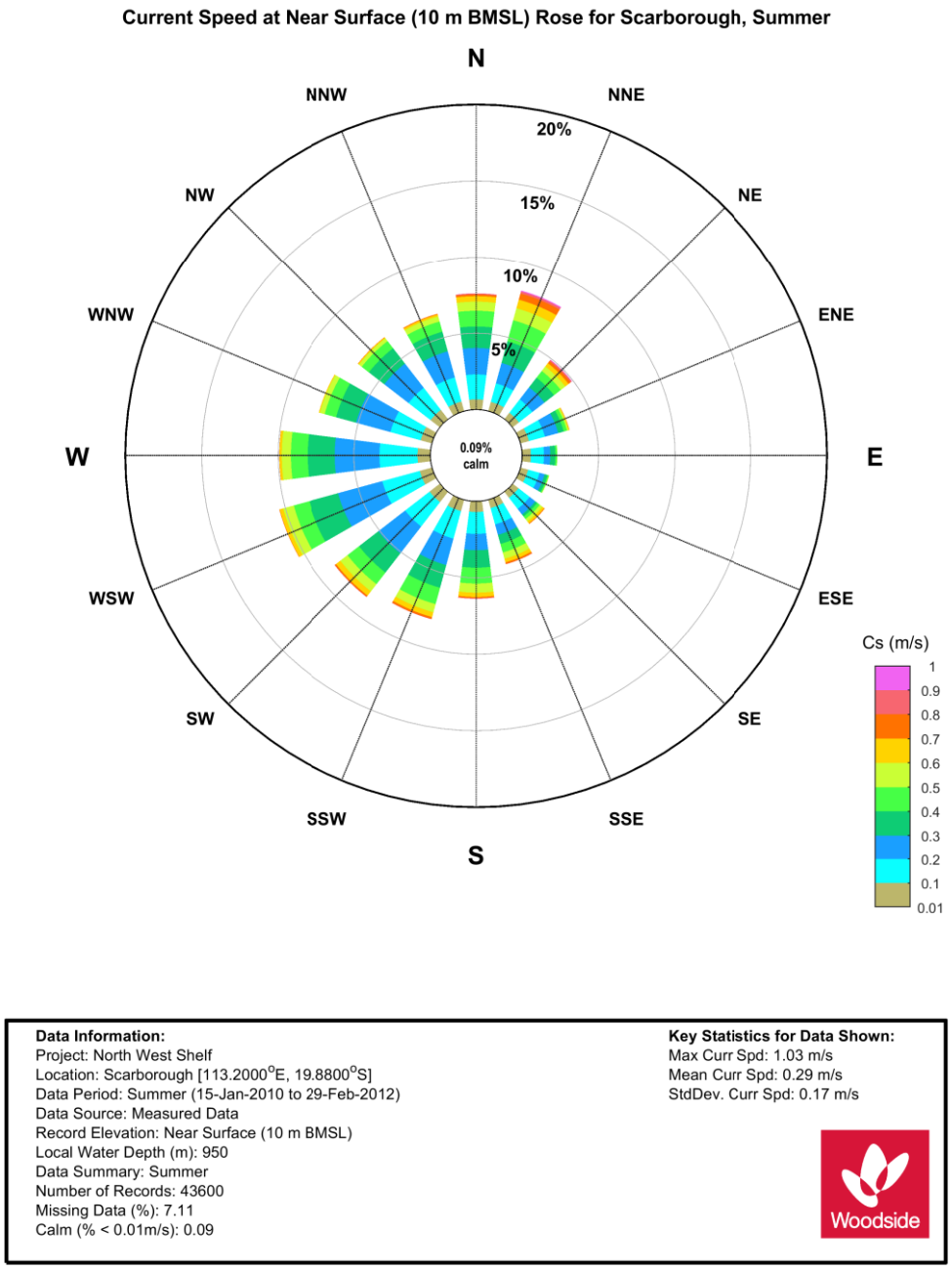


Figure 8. Summer (Nov - April) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the Scarborough location (cyclones removed) (WEL, 2018).

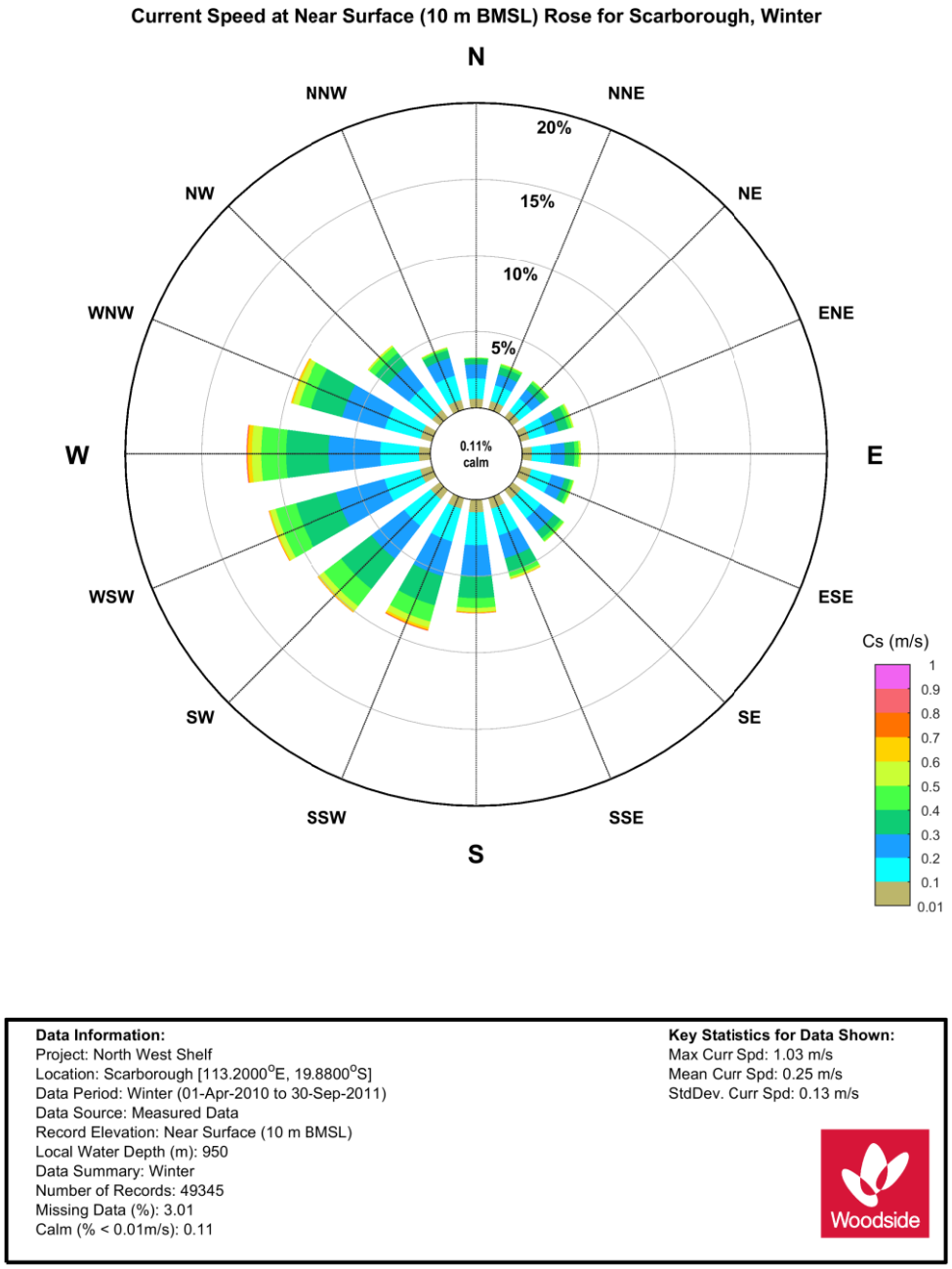


Figure 9. Winter (May-Sep) near surface combined frequency of 1-min mean current speed and direction (towards) measured at the Scarborough location (cyclones removed) (WEL, 2018).

North-west Cape

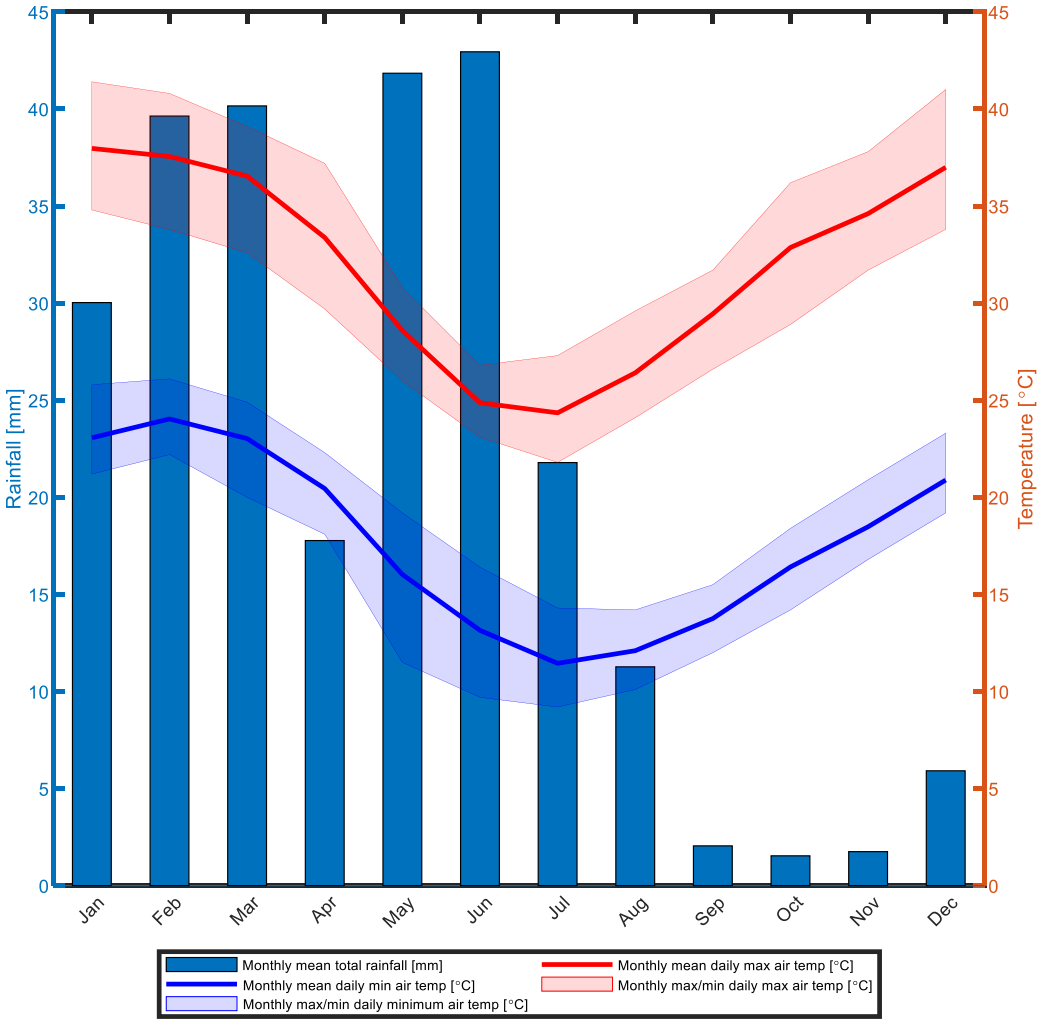


Figure 1. Monthly average total rainfall [mm] and air temperature [°C], calculated based on observations at the Learmonth Airport weather station from 1945-2020 and 1975-2020 respectively (Bureau of Meteorology 2020). Bars show the monthly average total rainfall values, and thick blue and red lines denote monthly average daily minimum and maximum air temperatures, respectively. Shaded blue and red areas denote monthly recorded extremes of daily minimum and maximum air temperature, respectively.

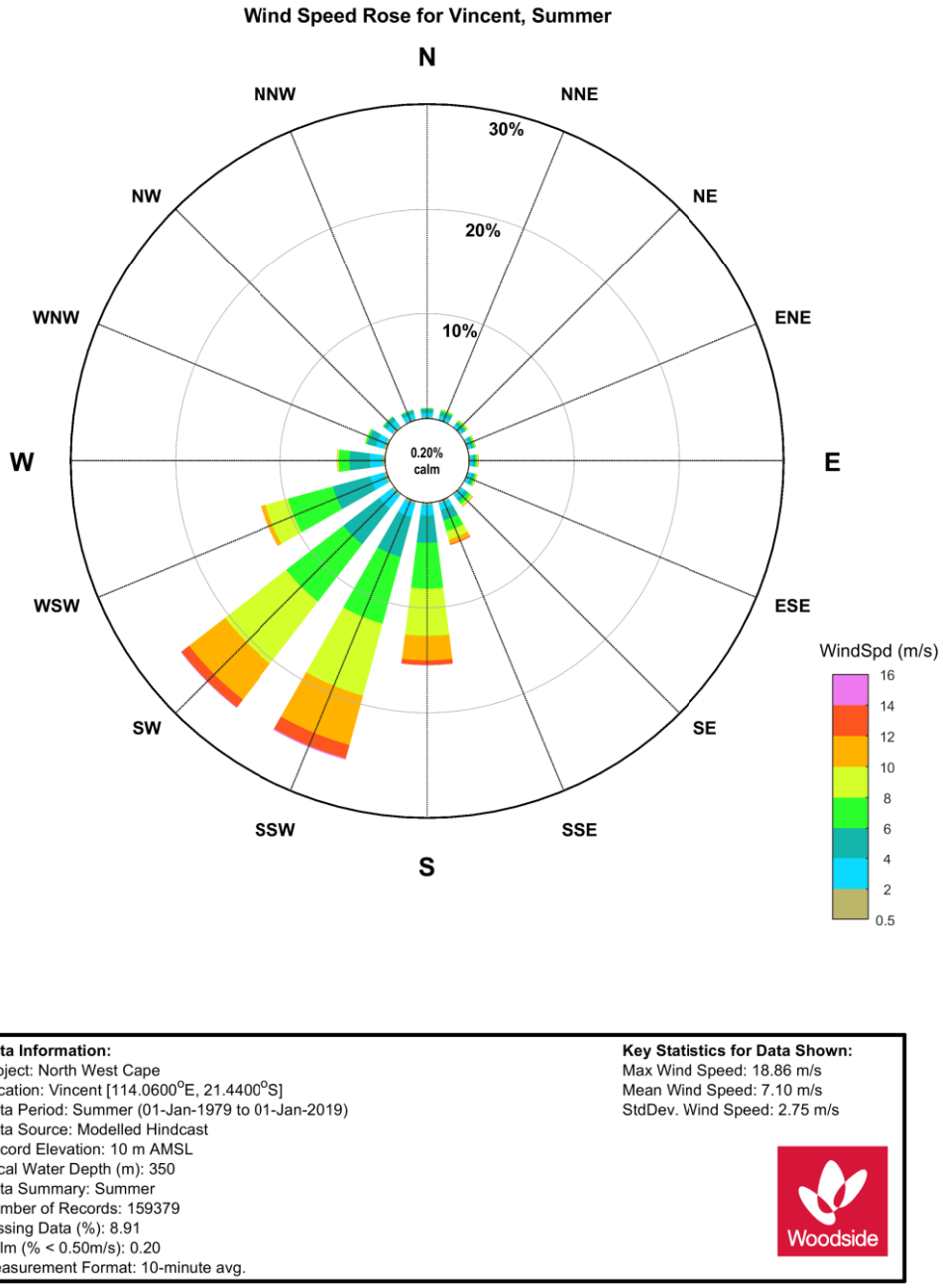
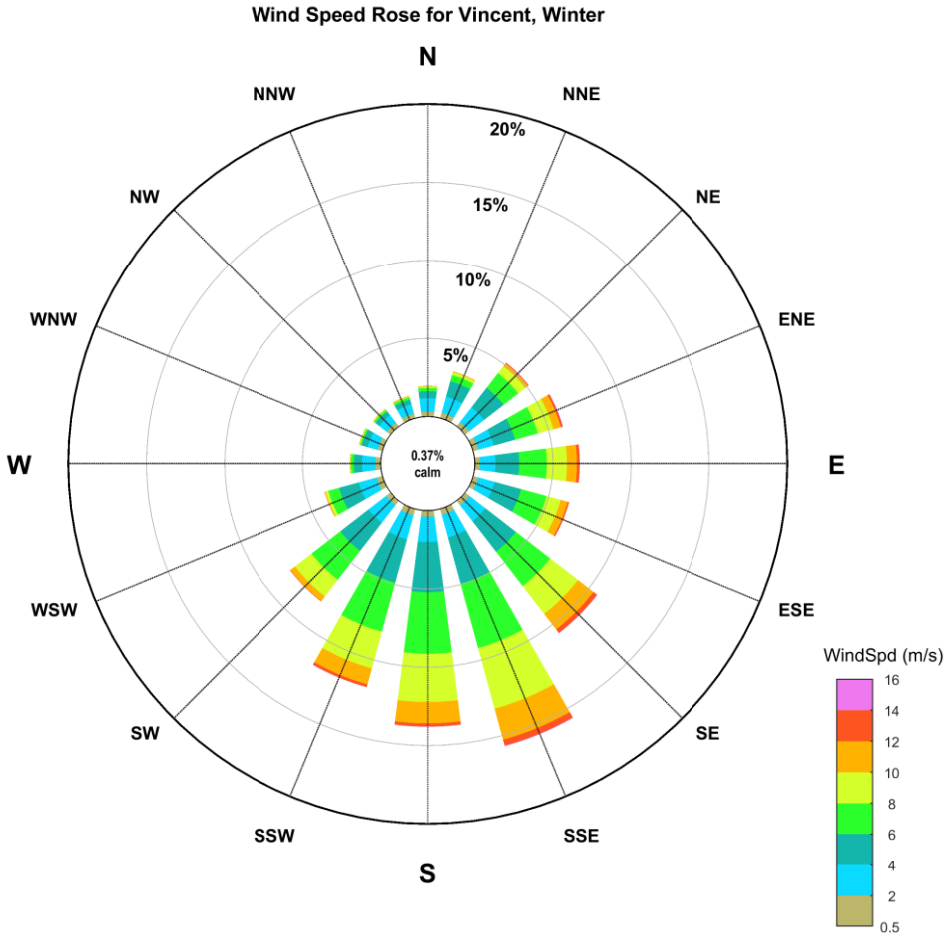


Figure 2. Summer distributions of wind speeds (10-minute at 10 m ASL) by 22.5° directional sectors at the Vincent site (Vincent Metocean). Note tropical cyclone events were not included in this distribution. Winds at Vincent in summer are predominantly from the SW to SSW in summer due to the presence of the Pilbara Heat Low (MetOcean Engineers, 2005).

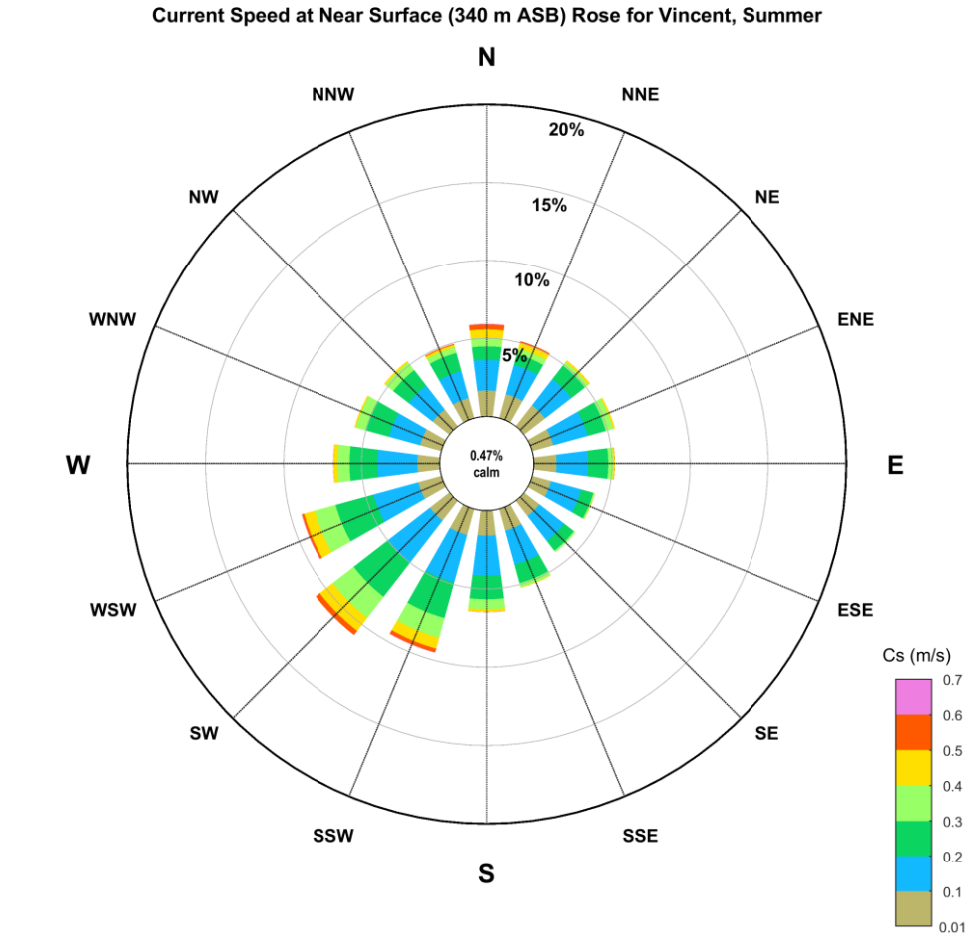


Data Information:
Project: North West Cape
Location: Vincent [114.0600°E, 21.4400°S]
Data Period: Winter (01-Apr-1979 to 30-Sep-2018)
Data Source: Modelled Hindcast
Record Elevation: 10 m AMSL
Local Water Depth (m): 350
Data Summary: Winter
Number of Records: 173626
Missing Data (%): 1.17
Calm (% < 0.50m/s): 0.37
Measurement Format: 10-minute avg.

Key Statistics for Data Shown:
Max Wind Speed: 19.39 m/s
Mean Wind Speed: 6.23 m/s
StdDev. Wind Speed: 2.78 m/s

Woodside

Figure 3. Winter distributions of wind speeds (10-minute at 10 m ASL) 22.5° directional sectors at the Vincent site (Vincent Metocean). Note tropical cyclone events were not included in this distribution. In winter, winds at are predominantly from the S to SE, associated with the South East Trades. Easterly gales are experienced at the Vincent location due to high pressure systems generating from the Great Australian Bight area to the site (MetOcean Engineers, 2005).

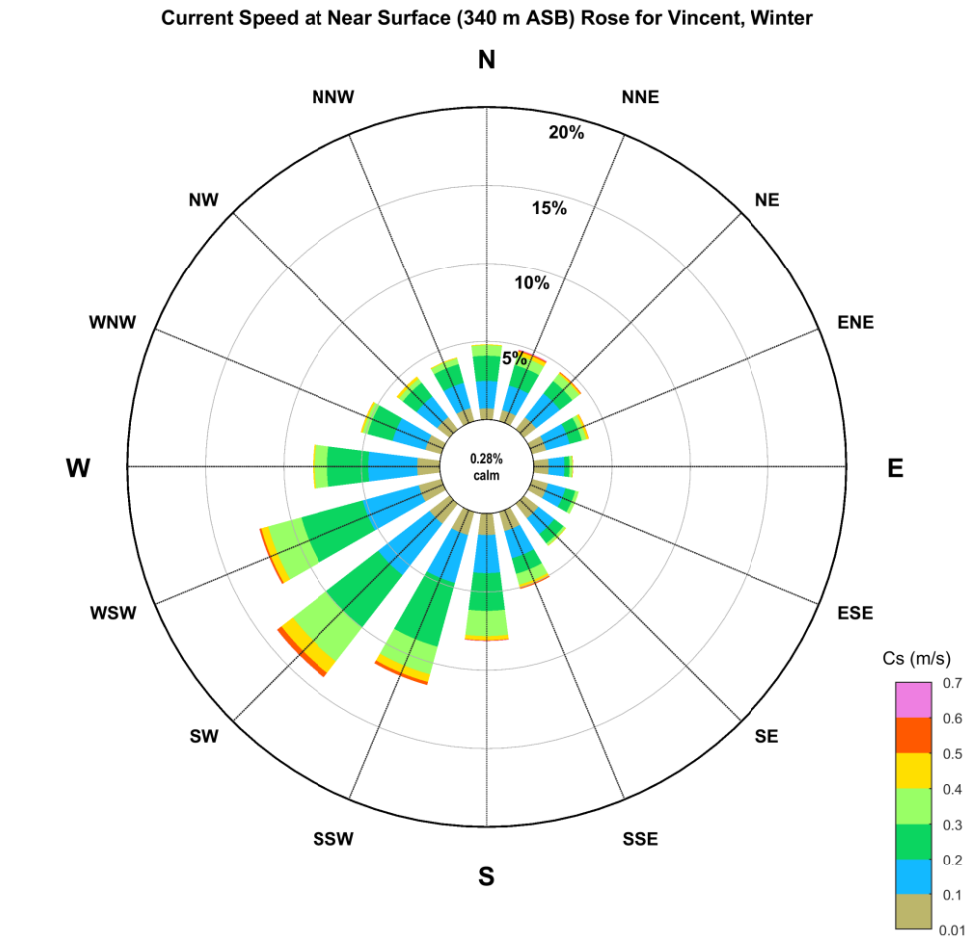


Data Information:
Project: North West Cape
Location: Vincent [114.0600°E, 21.4400°S]
Data Period: Summer (21-Nov-2000 to 13-Dec-2001)
Data Source: Measured Data
Record Elevation: Near Surface (340 m ASB)
Local Water Depth (m): 350
Data Summary: Summer
Number of Records: 144668
Missing Data (%): 1.59
Calm (% < 0.01m/s): 0.47

Key Statistics for Data Shown:
Max Curr Spd: 0.75 m/s
Mean Curr Spd: 0.19 m/s
StdDev. Curr Spd: 0.11 m/s

Woodside

Figure 4. Summer (May – Sep) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the Vincent location (cyclones removed) (WEL, 2016).



Data Information:
Project: North West Cape
Location: Vincent [114.0600°E, 21.4400°S]
Data Period: Winter (01-Apr-2001 to 30-Sep-2001)
Data Source: Measured Data
Record Elevation: Near Surface (340 m ASB)
Local Water Depth (m): 350
Data Summary: Winter
Number of Records: 126313
Missing Data (%): 4.13
Calm (% < 0.01m/s): 0.28

Key Statistics for Data Shown:
Max Curr Spd: 0.64 m/s
Mean Curr Spd: 0.20 m/s
StdDev. Curr Spd: 0.11 m/s

Woodside

Figure 5. Winter (Nov – Apr) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the Vincent location (cyclones removed) (WEL, 2016).

REFERENCES

AFMA 2021. Southern Blue Fin Tuna. Accessed 3 June 2021 www.afma.gov.au/fisheries-management/species/southern-bluefin-tuna

Bureau of Meteorology 2020. Climate Statistics for Australian Locations, Summary Statistics Broome Airport Accessed 1 October 2020 <http://www.bom.gov.au/climate/averages/tables/cw_003003.shtml>.

MetOcean Engineers 2005. Vincent Development Metocean Criteria Report No. R1276.

Metocean Solutions Ltd 2019. “Australia North-West Shelf wave hindcast: Description and

Validation of SWAN ST6 Wave Model”, DRIMS 1401150817.

RPS 2016. Metocean Criteria Guidelines for Modu Mooring on Australia’s North West Shellf, DRIMS 1400522719.

RPS Metocean Pty Ltd 2008. “Browse LNG Development - Offshore MetOcean Measurement

Programme: September 2006 to February 2008 Final Data Report.” CRN: JB0020RT0019.

Vincent Metocean – 40 Year Non-Cyclonic Metocean Database for Design Studies CRN: VAOOOORT1400067309.

WEL 2011. Greater Western Flank Detailed Metocean Design Criteria, Rev 2. CRN: A3000RG5492827.

WEL 2016. Vincent – Basic Design Data Specification sheet – Metocean CRN: VA0000RT1400067309.

WEL 2015. Winds Measured at North Rankin A 1995-2015.

WEL 2018. Scarborough Development - Non-Cyclonic and Operational Metocean Design Criteria – Spreadsheet, Revision A, CRN: SA0009CT1400722569.

WEL 2019. “Browse Development – Metocean Design Basis” CRN: JJ0013ST1400274448.