Eaglehawk-1 Wellhead Decommissioning Environment Plan

Decommissioning

November 2021

Revision 0

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1. INTRODUCTION

1.1 Overview

Woodside Energy Ltd. (Woodside), as Titleholder under the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (referred to as the Environment Regulations), proposes to undertake the following petroleum activities within Permit Area WA-28-P:

- permanently decommission the Eaglehawk-1 well and remove the wellhead and guide bases.

This activity will hereafter be referred to as the Petroleum Activities Program and forms the scope of this EP. A detailed description of the activities is provided in **Section 4**. 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 Purpose of the Environment Plan

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

- the potential environmental impacts and risks (planned (routine and non-routine) and unplanned) that may result from the Petroleum Activities Program are identified.
- appropriate management controls are implemented to reduce impacts and risks to a level that is 'as low as reasonably practicable' (ALARP) and acceptable.
- the Petroleum Activities Program is carried out in a manner consistent with the principles of ecologically sustainable development (ESD) (as defined in Section 3A of the *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 (EPOs), environmental performance standards (EPSs) and measurement criteria (MC). These form the basis for monitoring, auditing and managing the Petroleum Activities Program to be performed by Woodside and its contractors. The implementation strategy (derived from the decision support framework tools) specified within this EP provides Woodside and NOPSEMA with the required level of assurance that impacts and risks associated with the Petroleum Activities Program are reduced to ALARP and are acceptable.

1.3 Scope of the Environment Plan

The scope of this EP covers the activities that define the Petroleum Activities Program, as described in **Section 4**. The spatial boundary of the Petroleum Activities Program has been described and assessed using the Operational Area. The Operational Area defines the spatial boundary of the Petroleum Activities Program and is further described in **Section 4.4**.

1.4 Environment Plan Summary

The Eaglehawk-1 Wellhead Decommissioning EP summary (**Table 1-1**) has been prepared from material provided in this EP, 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 4**, starting at page 37

EP summary material requirement	Relevant section of this EP containing EP summary material
A description of the receiving environment	**Section 5**, starting at page 44
A description of the activity	**Section 4**, starting at page 37
Details of the environmental impacts and risks	**Section 7**, starting at page 98
The control measures for the activity	**Section 7.3**, starting at page 100
The arrangements for ongoing monitoring of the titleholder's environmental performance	**Section 8.5**, starting at page 188
Response arrangements in the oil pollution emergency plan	**Section 8.9**, starting at page 198
Consultation already undertaken and plans for ongoing consultation	**Section 6**, starting at page 75
Details of the titleholder's nominated liaison person for the activity	**Section 1.7**, starting at page 15

1.5 Structure of the Environment Plan

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

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

Criteria for acceptance	Content requirements/relevant regulations	Elements	Section of EP
Regulation 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** **Section 8**
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** **Section 8**
Regulation 10A(d): *provides for appropriate environmental performance outcomes, environmental performance standards and*	Regulation 13(7): *Environmental performance outcomes and standards*	Environmental Performance Outcomes (EPOs) Environmental Performance Standards (EPSs) Measurement Criteria (MC)	**Section 7**

Criteria for acceptance	Content requirements/relevant regulations	Elements	Section of EP
measurement criteria			
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) and scientific monitoring ongoing consultation.	**Section 8** **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 4** **Section 5** **Section 7**
Regulation 10A(g): *(i) the titleholder has carried out the consultations required by Division 2.2A* *(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate*	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 6**
Regulation 10A(h):	Regulation 15: *Details of the Titleholder and liaison person*	All contents of the EP must comply with the Offshore Petroleum and Greenhouse Gas	**Section 1.6** **Section 8.8**

Criteria for acceptance	Content requirements/relevant regulations	Elements	Section of EP
complies with the Act and the regulations	Regulation 16(c): *Details of all reportable incidents in relation to the proposed activity.*	Storage Act 2006 and the Environment Regulations	

1.6 Description of the Titleholder

Woodside is Titleholder for this activity, on behalf of its joint venture partners Shell Australia Pty. Ltd., BHP Billiton Petroleum (North West Shelf) Pty. Ltd., BP Developments Australia Pty. Ltd., Chevron Australia Pty. Ltd., CNOOC NWS Private Ltd. and Japan Australia LNG (MIMI) Pty. Ltd.

1.7 Details of Titleholder and Liaison Person

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

1.7.1 Titleholder

Woodside Energy Limited

11 Mount Street

Perth, Western Australia

T: 08 9348 4000

ACN: 63 005 482 986

1.7.2 Nominated Liaison Person

Shannen Wilkinson

Senior Corporate Affairs Adviser

11 Mount Street

Perth, Western Australia

Telephone: 08 9348 4000

Email: feedback@woodside.com.au

1.7.3 Arrangements for Notifying Change

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

1.8 Woodside Management System

The Woodside Management System (WMS) provides a structured framework of documentation to set common expectations governing how all employees and contractors at Woodside will work. Many of the standards presented in **Section 7** are drawn from the WMS documentation, which comprises four elements: compass and policies, expectations, processes and procedures, and guidelines, as outlined below (and illustrated in **Figure 1-1**).

- **Compass and Policies:** Set the enterprise-wide direction for Woodside by governing our behaviours, actions, and business decisions and ensuring we meet our legal and other external obligations.
- **Expectations:** Set essential activities or deliverables required to achieve the objectives of the Key Business Activities and provide the basis for developing processes and procedures.

- **Processes and Procedures:** Processes identify the set of interrelated or interacting activities that transforms inputs into outputs, to systematically achieve a purpose or specific objective. Procedures specify what steps, by whom, and when required to carry out an activity or a process.
- **Guidelines:** Provide recommended practice and advice on how to perform the steps defined in Procedures, together with supporting information and associated tools. Guidelines provide advice on how activities or tasks may be performed, information that may be taken into consideration, or, how to use tools and systems.

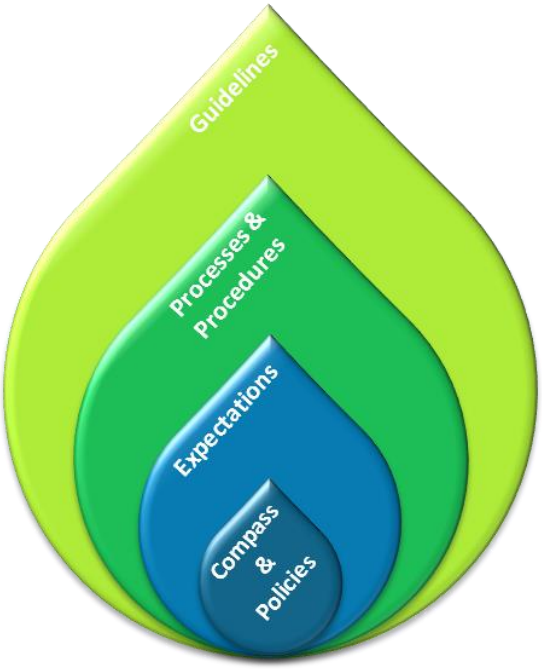


Figure 1-1: The four major elements of the WMS Seed

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.

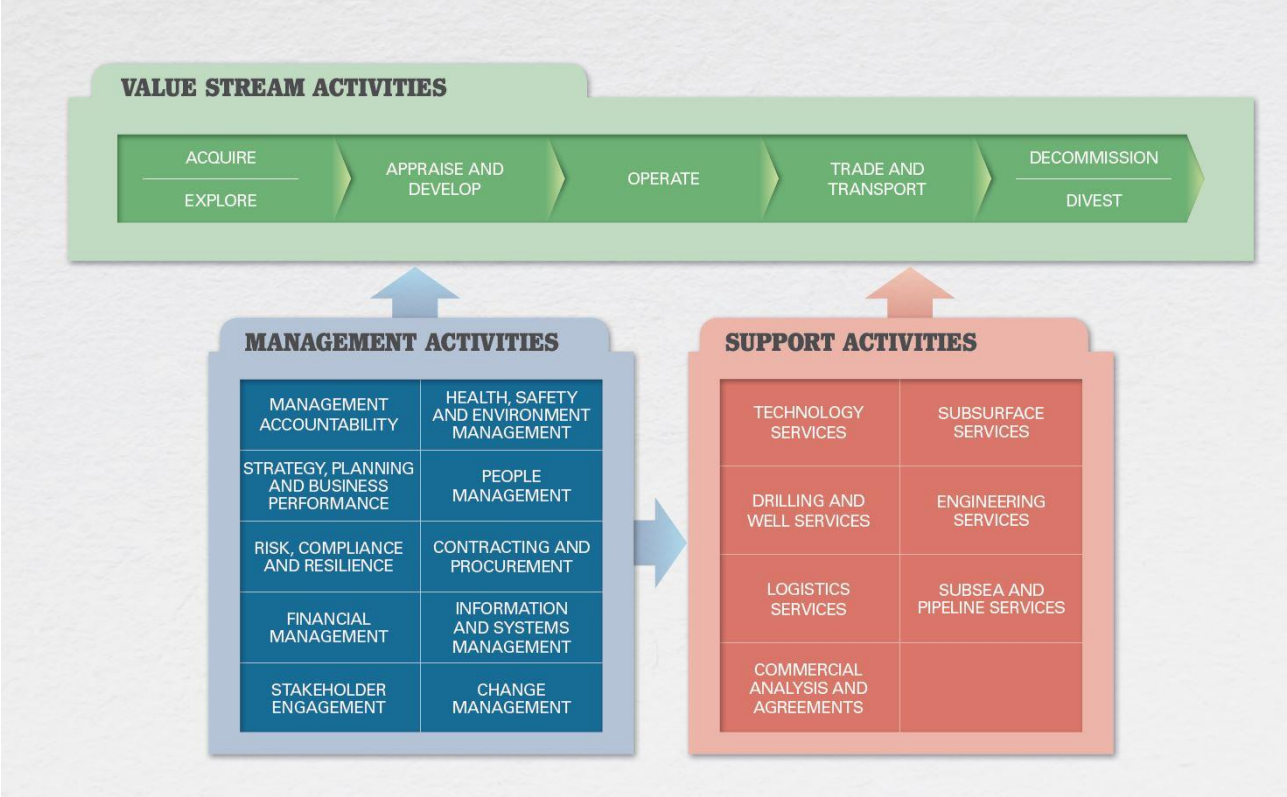


Figure 1-2: The WMS business process hierarchy

1.8.1 Health, Safety and Environment Policy

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

1.9 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 managing risks and impacts of the Petroleum Activities Program are detailed in **Appendix B**. This EP will not be assessed under the Western Australia (WA) *Environment Protection Act 1986* as the activity does not occur on State land or within State waters.

1.9.1 Applicable Environmental Legislation

1.9.1.1 Offshore Petroleum and Greenhouse Gas Storage Act 2006

The *Offshore Petroleum Greenhouse Gas Storage Act 2006* (OPGGS Act) regulates petroleum 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.

Under subsection 572(3) of the OPGGS Act, a titleholder must remove from the title area all structures that are no longer used in conjunction with the operations. Under subsection 572(7), property removal requirements are subject to any other provision of the OPGGS Act, the regulations, directions given by NOPSEMA or the responsible Commonwealth Minister, and any other law. Under subsection 270(3) of the OPGGS Act, before title surrender, all property brought into the surrender area must be removed to the satisfaction of NOPSEMA, or arrangements that are satisfactory to NOPSEMA must be made relating to the property.

This EP complies with subsections 270(3), 572(3) and 572(7) of the OPGGS Act.

1.9.1.2 Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009

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 ecological sustainable development
- 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.

1.9.1.3 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act aims to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places in Australia. These are defined in the Act as Matters of National Environmental Significance (MNES). In respect to offshore petroleum activities in Commonwealth waters, these requirements are implemented by NOPSEMA through the Streamlining Offshore Petroleum Environmental Approvals Program (the Program). The Program provides for the protection of the environment by requiring all offshore petroleum activities authorised by the OPGGS Act to be conducted in accordance with an accepted EP, consistent with the principles of Ecological Sustainable Development (ESD). Impacts on the environment include those matters protected under Part 3 of the EPBC Act. The definition of 'environment' in the Program is consistent with that used in the EPBC Act - this enables the Program to encompass all matters protected under Part 3 of the EPBC Act.

The Eaglehawk-1 well was drilled prior to the EPBC Act coming into force and there are no conditions set under the EPBC Act that apply to the Petroleum Activities Program.

1.9.1.3.1 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 respect to offshore petroleum activities in Commonwealth waters, these requirements are implemented by NOPSEMA via the commitments included 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 Environment Plan that proposes activities that will result in unacceptable impacts to a listed threatened species or ecological community.
- NOPSEMA will not accept an Environment Plan that is 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 Environment Plan.

1.9.1.3.2 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 Australian Government must not perform functions or exercise powers relating to these parks that are inconsistent with management plans (s.362 of the EPBC Act). Relevant AMPs are described in **Section 5.8**. The North-west Marine Parks Network Management Plan (DNP, 2018) describes the requirements for managing the marine parks that are relevant to this EP.

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.

1.9.1.3.3 World Heritage Properties

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

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). 3.02 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	3.01 and 3.02: Assessment of significant impact on World Heritage values is included in Section 7. Principles are met by the submitted EP. 3.03 (a) and (b): World Heritage values are identified in Section 5 and considered in the assessment of impacts and risks for the Petroleum Activity in Section 7. 3.03 (c): Relevant stakeholder consultation and feedback

	(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.	received in relation to impacts and risks to the Ningaloo Coast and Shark Bay World Heritage Properties (which are both within the scope of this EP) are outlined in Section 6. 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 that Woodside follows to prepare the EP once an activity has been defined as a petroleum activity (refer **Section 1.1**). This includes a description of the environmental risk management methodology that is 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 environmental impacts and risks of the Petroleum Activities program to be detailed and evaluated appropriate to the nature and scale of each impact and risk associated with the selected Petroleum Activities Program. The objective of the risk assessment process, described in this section, is to identify the risks and associated impacts of an activity so they can be assessed, appropriate control measures applied to eliminate, control or mitigate the impact or risk to ALARP, then determine if the impact or risk level is acceptable.

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

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

Herein, potential impact from planned activities are termed 'impacts', and 'risks' are associated with unplanned events with the potential for impact (should the risk be realised), with such impacts termed potential 'consequence'.

2.2 Environmental Risk Management Methodology

Woodside recognises that risk is inherent to its business and effectively managing risk is vital to delivering on company objectives, success and continued growth. Woodside is committed to managing all risks proactively and effectively. The objective of Woodside's risk management system is to provide a consistent process for recognising and managing risks across its business. Achieving this objective includes ensuring risks consider impacts across the 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 31000:2009. The WMS risk management procedure, guidelines and tools provide guidance on 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 that the 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**. Each step and how it is applied to the scopes of this activity is described in **Sections 2.4** to **2.11**.

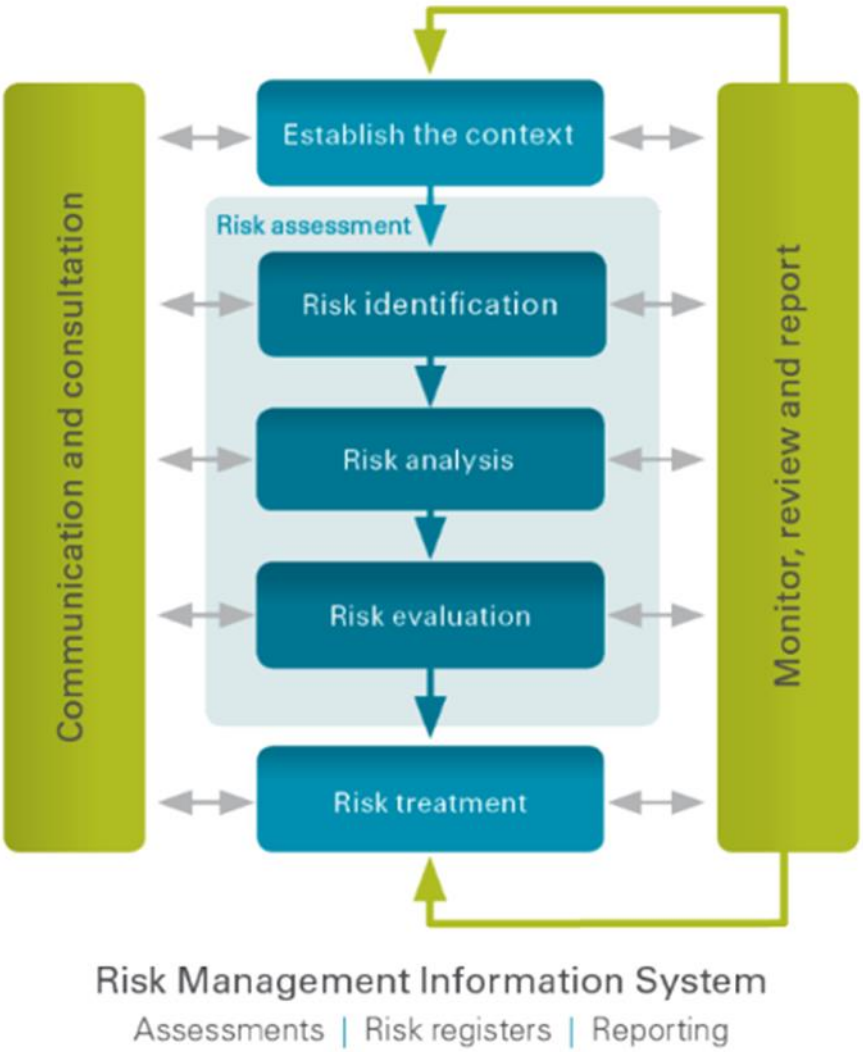


Figure 2-1: Woodside's risk management process

2.2.1 Healthy, Safety and Environment Management Procedure

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

2.2.2 Impact Assessment Procedure

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

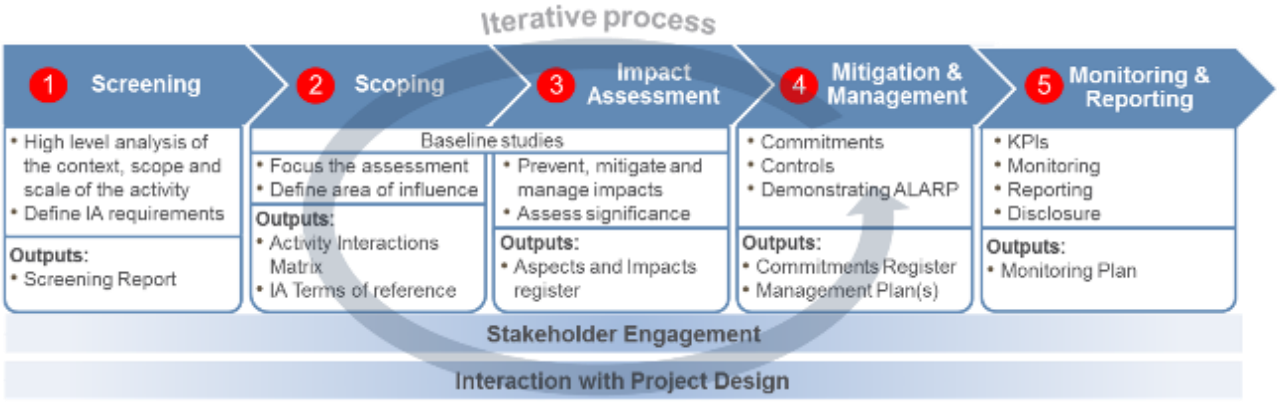


Figure 2-2: Woodside's impact assessment process

2.3 Environmental Plan Process

Figure 2-3 illustrates the EP development process. Each element of this process is discussed further in **Sections 2.4** to **2.11**.

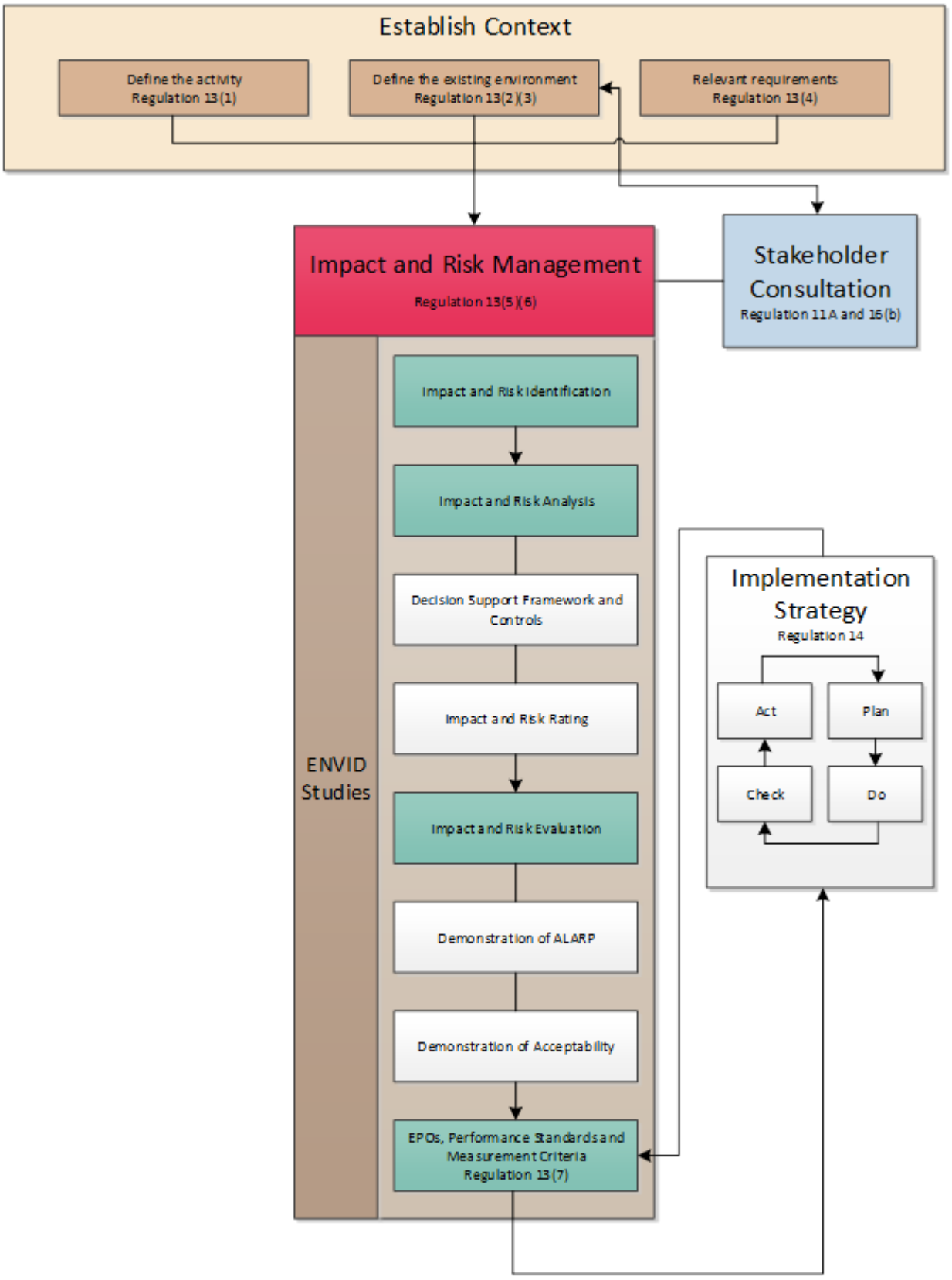


Figure 2-3: Environment Plan development process

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 then described in relation to:

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

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

The activity is described in **Section 4** and referred to as the Petroleum Activities Program.

2.4.2 Defining the Existing Environment

The context of the existing environment is described and determined by considering the nature and scale of the activity (size, type, timing, duration, complexity, and intensity of the activity), as described in **Section 4**. In accordance with Regulation 31(1) of the Environment Regulations, references to the Master Existing Environment, Appendix H in the Enfield Plug and Abandonment EP, have been made throughout this EP. The accepted EP (NOPSEMA EP No: 5632, ID: A803388 is available on the NOPSEMA website: Enfield Plug and Abandonment EP » NOPSEMA. The purpose is to describe the existing environment that may be impacted by the activity, directly or indirectly, by planned or unplanned events.

The existing environment section (**Section 5**) is structured to define the physical, biological, socio economic and cultural attributes of the area of interest, in accordance with the definition of 'environment' in Regulation 4(a) of the Environment Regulations. These sub-sections 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 2.6.2**) and rated for all planned and unplanned activities. Additional detail is provided for evaluating unplanned hydrocarbon spill risk.
- 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 (EMBA), as determined by the hydrocarbon spill risk assessments presented in **Section 7.7**. MNES, as defined within the EPBC Act, are addressed through Woodside's impact and risk assessment (**Section 7**).
- relevant values and sensitivities, which may include world or national Heritage Listed areas, Ramsar wetlands, listed threatened species or ecological communities, listed migratory species, and sensitive values that exist in or in relation to Commonwealth marine area or land.
- in categorising the environmental values potentially impacted by the Petroleum Activities Program (as presented in **Table 2-1**), there is standardisation of information relevant to understanding the receiving environment. Potential impacts to these environmental values are evaluated in the risk analysis (refer **Section 2.6**), and risk-rated for all planned and unplanned

activities. This provides a robust approach to the overall environmental risk evaluation and its documentation in the EP.

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: Environmental values potentially impacted by the Petroleum Activities Program which are assessed within the EP

Environmental Value Potentially Impacted (Regulations 13(2)(3))					
Marine Sediment	Water Quality	Air Quality	Ecosystems/ Habitats	Species	Socio-Economic

2.4.3 Relevant Requirements

The relevant requirements in the context of legislation, other environmental approval requirements, conditions and standards that apply to the Petroleum Activities Program have been identified and reviewed. Relevant requirements are presented in **Appendix B** and **Section 1**.

Woodside's Corporate Health, Safety and Environment Policy is presented in **Appendix A**.

2.5 Impact and Risk Identification

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

The environmental impact and risk assessment presented in this EP has been informed by recent and historic hazard identification studies and workshops (e.g. HAZID/Environmental Hazard Identification [ENVID]), Process Safety Risk Assessment processes, reviews and associated desktop studies associated with the Petroleum Activities Program. Risks are identified based on planned and potential interaction with the activity (based on the description in **Section 4**), the existing environment (**Section 5**) and the outcomes of Woodside's stakeholder engagement process (**Section 6**). The environmental outputs of applicable risk and impact workshops and associated studies are referred to as 'ENVID' hereafter in this EP.

An ENVID workshop was conducted for the Petroleum Activities Program on 4 May 2021. Participants included project environmental advisors, environmental engineers, development coordinator, subsea engineer and drilling engineers. The participants' breadth of knowledge, training and experience was sufficient to reasonably assure that the hazards that may arise in connection with the Petroleum Activities Program in this EP were identified.

Impacts and risks were identified during the ENVID for both planned (routine and non-routine) activities and unplanned (accidents, incidents and emergency conditions) events. During this process, risks that are identified as not applicable (not credible) are removed from the assessment. This is done by defining the activity and identifying that an aspect is not applicable.

The impact and risk information was then 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 was used to present the risk assessment and forms the basis to develop EPOs, EPSs and MC. This information is presented in **Section 7**, using the format presented in **Table 2-2**.

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

Source of Risk	**Evaluation**											
	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. Risk analysis considered previous risk assessments for similar activities, reviews of relevant studies, reviews of past performance, external stakeholder consultation feedback and a review of the existing environment.

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

- identify the decision type in accordance with the decision support framework
- identify appropriate control measures (preventative and mitigative) aligned with the decision type
- assess the risk rating or impact.

2.6.1 Decision Support Framework

To support the risk assessment process and Woodside's determination of acceptability **(Section 2.9.2**), Woodside's HSE risk management procedures include using a decision support framework based on principles set out in the Guidance on Risk Related Decision Making (Oil and Gas UK, 2014). This concept is applied during the ENVID, or equivalent preceding processes during historical design decisions, to determine the level of supporting evidence that may be required to draw sound conclusions about risk level and whether the risk is ALARP and acceptable. This is to confirm:

1. activities do not pose an unacceptable environmental risk
2. appropriate focus is placed on activities where the risk is anticipated to be acceptable and demonstrated to be ALARP
3. appropriate effort is applied to manage risks 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 (referred to as Decision Type A, B or C). The decision type is selected based on an informed discussion about the uncertainty of the risk and documented in ENVID output.

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

2.6.1.1 Decision Type A

Risks classified as a Decision Type A are well understood and established practice. They generally consider recognised good industry practice, which is often embodied in legislation, codes and standards, and use professional judgement.

2.6.1.2 Decision Type B

Risks classified as Decision Type B 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 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

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

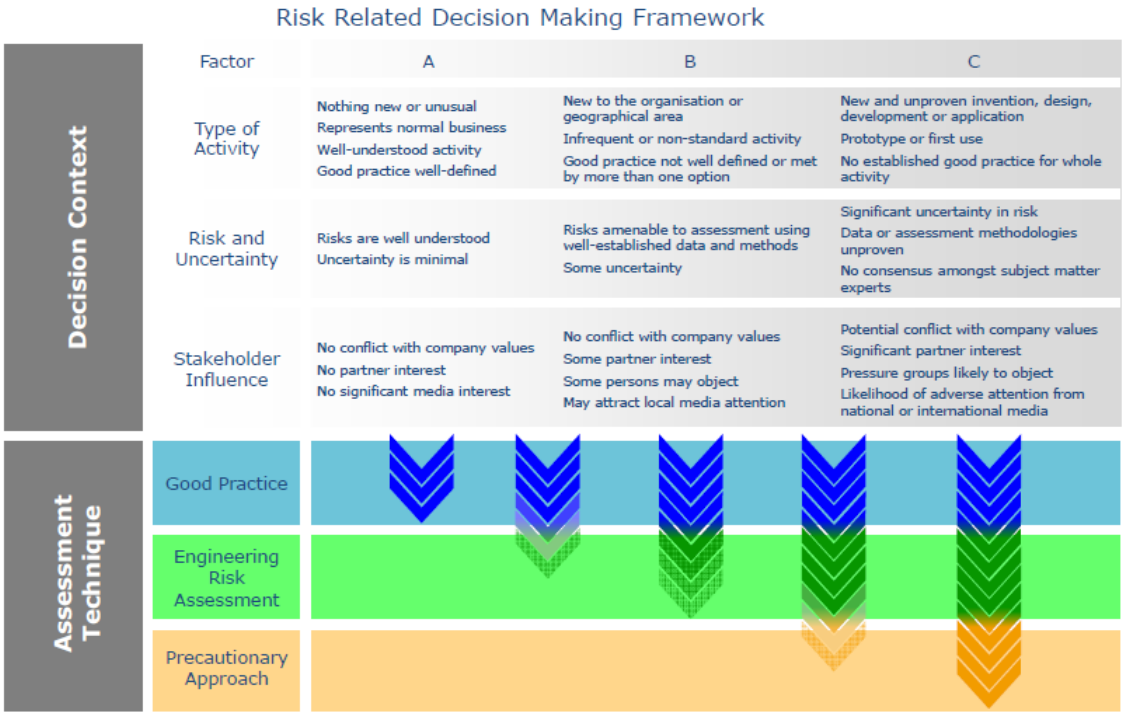


Figure 2-4: Risk-related decision-making framework (Oil and Gas UK 2014)

2.6.2 Decision Support Framework Tools

The following framework tools are applied, as appropriate, to help identify control measures based on the decision type described above:

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

2.6.3 Decision Calibration

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

- **Legislation, Codes and Standards/Verification of Predictions** – verification of compliance with applicable LCS and/or good industry practice.
- **Peer Review** – independent peer review of PJs, supported by risk based analysis, where appropriate.
- **Benchmarking** – where appropriate, benchmarking against a similar facility or activity type or situation that has been accepted to represent acceptable risk.
- **Internal Stakeholder Consultation** – consultation performed within Woodside to inform the decision and verify CVs are met.
- **External Stakeholder Consultation** – consultation performed to inform the decision and verify societal values are considered.

Where appropriate, additional calibration tools may be selected specific to the decision type and the activity.

2.6.3.1 Control Measures (Hierarchy of Controls)

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

- **Elimination** of the risk by removing the hazard.
- **Substitution** of a hazard with a less hazardous one.
- **Engineering Controls** include design measures to prevent or reduce the frequency of the risk event, or detect or control the risk event (limiting the magnitude, intensity and duration) such as:
  - Prevention: design measures that reduce the likelihood of a hazardous event occurring.
  - Detection: design measures that facilitate early detection of a hazardous event.
  - Control: design measures that limit the extent/escalation potential of a hazardous event.

- Mitigation: design measures that protect the environment if a hazardous event occurs.
- Response Equipment: design measures or safeguards that enable clean up/response after a hazardous event occurs.

Procedures and Administration includes management systems and work instructions used to prevent or mitigate environmental exposure to hazards.

Emergency Response and Contingency Planning includes methods to enable recovery from the impact of an event (e.g. protection barriers deployed near the sensitive receptor).

2.6.4 Impact and Risk Classification

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

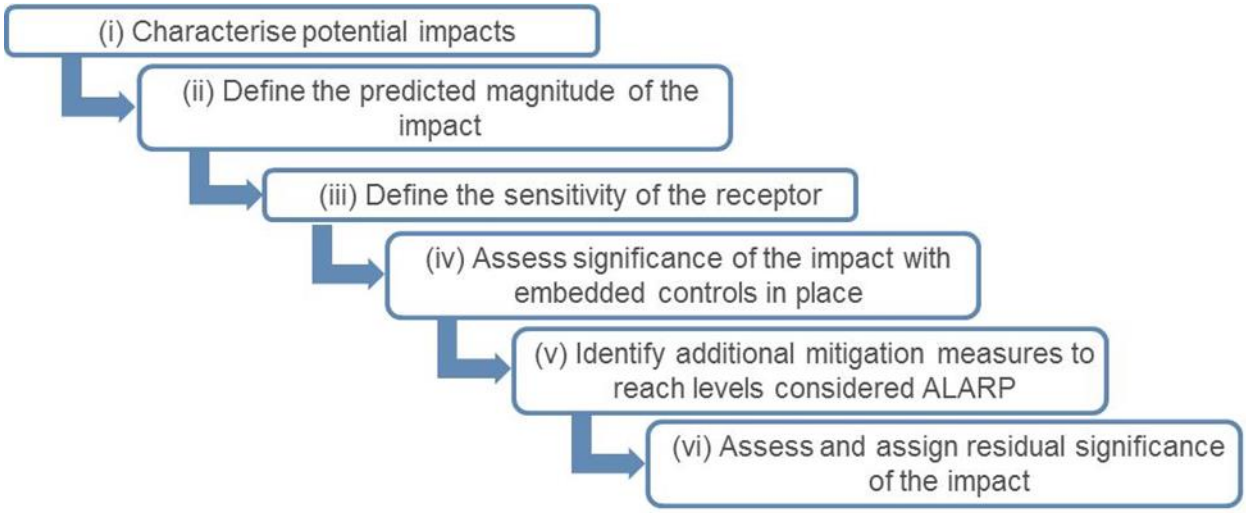


Figure 2-5: Environmental impact and risk analysis

Impacts are classified in accordance with the consequence (**Section 2.4**) outlined in the Woodside Risk Management Procedure and Risk Matrix.

Risks are assessed qualitatively and/or quantitatively in terms of both likelihood and consequence in accordance with the Woodside Risk Management Procedure and Risk Matrix.

The impact and risk information is summarised, including classification, and evaluation information, as shown in the example in **Table 2-2**, evaluated 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 (more than 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes	Catastrophic, long-term impact (more than 20 years) to a community, social infrastructure or highly valued areas/items of international cultural significance	A
Major, long-term impact (ten to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes	Major, long-term impact (five to 20 years) to a community, social infrastructure or highly valued areas/items of national cultural significance	B
Moderate, medium-term impact (two to ten years) on ecosystems, species, habitat or physical or biological attributes	Moderate, medium term Impact (two to five years) to a community, social infrastructure or highly valued areas/items of national cultural significance	C

Minor, short-term impact (one to two years) on species, habitat (but not affecting ecosystems function), physical or biological attributes	Minor, short-term impact (one to two years) to a community or highly valued areas/items of cultural significance	D
Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes	Slight, short-term impact (less than one year) to a community or areas/items of cultural significance	E
No lasting effect (less than one month); localised impact not significant to environmental receptors	No lasting effect (less than one month); localised impact not significant to areas/items of cultural significance	F

2.6.5 Risk Rating Process

The risk rating process is performed to assign a level of risk to each risk event, measured in terms of consequence and likelihood. The assigned risk level is therefore 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 performed using the following steps:

2.6.5.1 Select the Consequence Level

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

2.6.5.2 Select the Likelihood Level

Determine the description that best fits the chance of the selected consequence occurring, assuming reasonable effectiveness of the preventative and mitigative 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 1000–10,000 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

2.6.5.3 Calculate the Risk Rating

The risk level is derived from the consequence and likelihood levels determined above in accordance with the risk matrix shown in **Figure 2-6**. A likelihood and risk rating is only applied to environmental risks using the Woodside risk matrix.

This risk level 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.

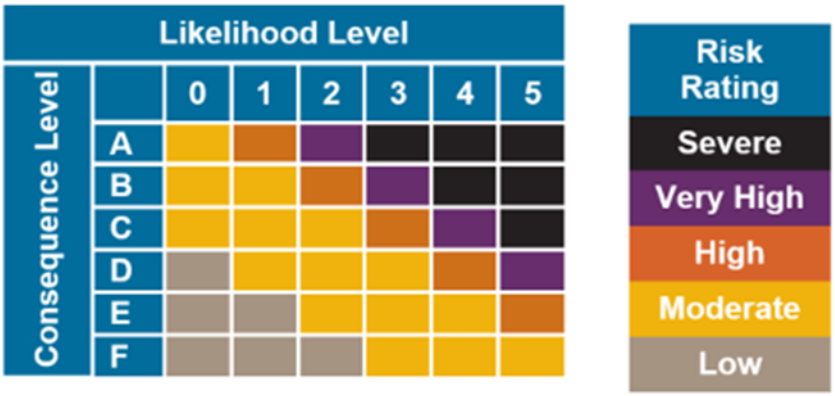


Figure 2-6: Woodside risk matrix – risk level

To support ongoing risk management (a key component of Woodside's Process Safety Management Framework – refer to Implementation Strategy (**Section 8**)), Woodside uses the concept of 'current risk' and applies a current risk rating to indicate the current or 'live' level of risk, considering the controls that are currently in place and regularly effective. 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 the communication and visibility of the risk events, and ensures risk is continually managed to ALARP by identifying risk reduction measures and assessing acceptability.

2.7 Impact and Risk Evaluation

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

- Decision Type
- Principles of ESD – as defined under the EPBC Act
- Internal context – ensuring the proposed controls and risk level are consistent with Woodside policies, procedures and standards (**Section 7** and **Appendix A**)
- External context – the environment consequence (**Section 7**) and stakeholder acceptability (**Section 6**)
- Other requirements – ensuring the proposed controls and risk level 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 or risk.

2.7.1 Demonstration of ALARP

Descriptions have been provided in **Table 2-5** to 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 consequences)	***Negligible, Slight, or Minor (D, E or F)***	***A***
Woodside demonstrates these risks, impacts and decision types are reduced to ALARP if: • controls identified meet legislative requirements, industry codes and standards, applicable company requirements and industry guidelines • further effort towards impact/risk reduction (beyond employing opportunistic measures) is not reasonably practicable without sacrifices grossly disproportionate to the benefit gained.		
High, Very High or Severe (C+ consequence risks)	***Moderate and above (A, B or 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

Descriptions have been provided in **Table 2-6** to articulate how Woodside demonstrates that 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 lower order risks, impacts and decision types are 'Broadly Acceptable' if they meet: • legislative requirements • industry codes and standards • applicable company requirements and where further effort towards reducing risk (beyond employing opportunistic measures) is not reasonably practicable without sacrifices grossly disproportionate to the benefit gained.		
High, very high or severe	***Moderate and above (A, B or C)***	***B and C***
Woodside demonstrates these higher order risks, impacts and decision types are 'Acceptable' 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**), and – Impact/risk does not contravene relevant principles of ESD, as defined under the EPBC Act. – Internal context – the proposed controls and consequence/risk level are consistent with Woodside policies, procedures and standards. – External context – stakeholder expectations and feedback have been considered (**Section 6**). – Other requirements – the proposed controls and consequence/risk level are consistent with national and international industry standards, laws and policies, and applicable plans for management and conservation advices, conventions, and significant impact guidelines (e.g. for MNES) have been considered. Where there are significant complexities in assessing and managing impacts to different receptors and for demonstrating how these impacts are acceptable (e.g. significant stakeholder concern for specific receptors, lack of consensus of appropriate controls or standards), acceptability may be demonstrated 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.		

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 1.9.1.3.1**). The steps in this process are:

- identify relevant listed threatened species and ecological communities (**Section 5.6**).
- identify relevant recovery plans and threat abatement plans (Appendix H of the accepted Enfield Plug and Abandonment EP, **Section 7.8**).
- 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 7.8**).
- 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 7.8**).

2.9 Environmental Performance Outcomes, Standards and Measurement Criteria

EPOs, EPSs and MC have been defined to address the potential environmental impacts and risks and are presented in **Section 7**.

2.10 Implementation, Monitoring, 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 Petroleum Activities Program. The implementation 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 standards set out in the EP are met through monitoring, recording, audit, management of non-conformance and review.
- 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 to respond to and monitor impacts from oil pollution emergencies.
- environmental reporting requirements, including 'reportable incidents', are met.
- appropriate stakeholder consultation is performed throughout the activity.

The implementation strategy is presented in **Section 8**.

2.11 Stakeholder Consultation

A stakeholder assessment is performed to identify relevant persons (as defined under Regulation 11A of the Environment Regulations). An activity update is issued electronically to relevant stakeholders to provide a reasonable consultation period. Further details and information are provided to any stakeholder if requested.

Each stakeholder response is summarised and assessed and a response, where appropriate, is provided by Woodside.

The stakeholder consultation, along with the process for ongoing engagement and consultation throughout the activity, is presented in **Section 6**. A copy of the full text correspondence with relevant people is provided in **Appendix F**.

3. DECOMMISSIONING OPTIONS ASSESSMENT

A Decommissioning Options Assessment was undertaken on the Eaglehawk-1 wellhead to determine whether there were any suitable alternatives to the removal outlined in Section 572(3) of the OPGGS Act. The Options Assessment determined that the preferred decommissioning method was removal. Since removal does not require additional requirements under the OPGGS Act (e.g. 270(3)), no additional information is provided in this EP.

4. DESCRIPTION OF THE ACTIVITY

4.1 Overview

This section has been prepared in accordance with Regulation 13(1) of the Environment Regulations, and describes the activity to be undertaken as part of the Petroleum Activities Program under this EP.

4.2 Petroleum Activities Program Overview

An overview of the Petroleum Activities Program is provided in **Table 4-1**.

Table 4-1: Petroleum Activities Program Overview

Item	Description
Title	WA-28-P
Well	Eaglehawk-1
Vessels	Offshore support vessel such as an inspection, maintenance and repair (IMR) vessel or semisubmersible heavy well intervention vessel. Potential for additional general support vessel.
Key activities	Removal and recovery of wellhead and associated infrastructure to allow for permanent abandonment of the well.

4.3 Location

The well is located within permit area WA-28-P about 137 km north-west from Dampier (**Figure 4-1**). Details of the well locations and water depths are provided in **Table 4-2**.

Table 4-2: Approximate location details for the Petroleum Activities Program including all relevant infrastructure

Well	Water depth (m LAT)	Approximate height of wellhead above mudline (m)	Latitude	Longitude
Eaglehawk-1	~120	4.5	116° 16’ 41.386” E	19° 30’ 22.199” S

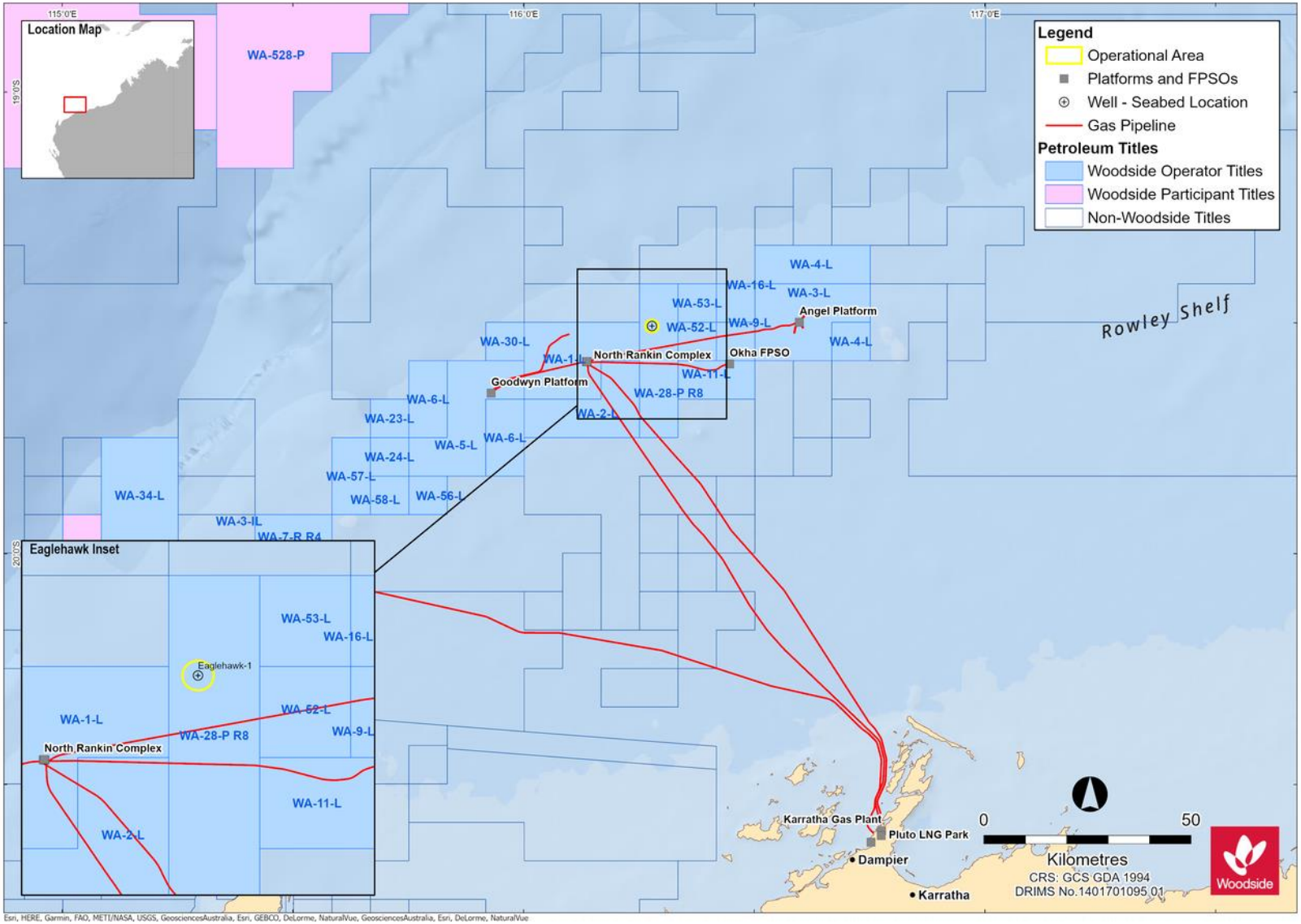


Figure 4-1: Location of the Petroleum Activities Program

4.4 Operational Area

The Operational Area applicable to the scope of this EP is shown in **Figure 4-1**. The Operational Area is the spatial boundary of the Petroleum Activities Program, defined by the planned impacts and risks assessed and managed by this EP. The Operational Area includes the area encompassing a 1500 m radius around the wellhead. A temporary 500 m radius exclusion zone will be maintained around the project vessels during operations.

Vessel-related activities within the Operational Area will comply with this EP. Vessels supporting the Petroleum Activities Program when outside the Operational Area must adhere to applicable maritime regulations and other requirements. This EP applies to activities undertaken within the Operational Area.

4.5 Timing

The proposed timing for the Petroleum Activities Program is outlined in **Table 4-3**. The activity may occur at any time of year within 5 years of EP acceptance.

Table 4-3: Summary of Petroleum Activities Program timing

Activity	Approximate timing (and cumulative duration in the field)
Removal of wellhead and associated infrastructure	2022-2026 (cumulative duration: up to 10 days)

4.6 Infrastructure Overview

The details of the well history and composition is summarised in **Table 4-4**.

Table 4-4: Summary of Petroleum Activities Program infrastructure

Well	Year drilled	Well status	Drilling fluids	Shallowest cement plug depth (m below seafloor)	Wellhead and associated infrastructure remaining
Eaglehawk-1	1972	Permanently plugged	The well was drilled with seawater and high-viscosity gel sweeps to 429 m MDRT. Remainder of the well was drilled with water based drilling fluid (WBM).	36.6	Wellhead Permanent guide base Temporary guide base

4.6.1 Wellhead and Associated Infrastructure Composition

The wellhead is comprised of mild steel, with small amounts of elastomeric materials such as Teflon and Viton used within the seal components (representing, less than 1% of the wellhead composition). Surface coatings and paints have been used on the wellhead for corrosion protection and are likely to be zinc-oxide based, given its age. Steel debris or corrosion caps sit on top of the wellhead to protect it from marine growth and corrosion. The total weight of the steel material is estimated to be about 7500 kg and the height above the mudline 4.5 m.

The permanent guide base (PGB) and temporary guide base (TGB) are comprised of mild steel.

Naturally occurring radioactive material (NORM) and mercury are not expected to be present within the wellhead or associated infrastructure to be removed.

4.6.2 Residual Chemicals and Fluids

Chemicals and fluids within the wells either above the top cement plug or trapped within the casing annuli have the potential to leak from the wellhead during removal. The volumes remaining, approximately 1.5 m^3 of displacement fluids and approximately 121 m^3 of fluids in the casing annuli**,**

have been calculated based on the depth of the shallowest plug and diameter of the inner casing/well. There is no credible risk of fluids below the plug being released to the marine environment as the well has been accepted as abandoned by NOPSEMA.

The typical chemicals within the displacement fluids and residual fluids in the casing annuli are presented in **Table 4-5** along with their function and Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Offshore Chemical Notification Scheme (OCNS) ranking. Woodside's chemical assessment process is further described in **Section 4.11**.

Table 4-5: Typical residual chemicals and fluids above the top cement plug and within the casing annuli

Chemical	Function	OCNS ranking
Displacement fluids		
Corrosion Inhibitor	Prevent corrosion in the wellhead	Gold
Biocide	Prevent marine growth in the wellhead	E
Fluids in casing annuli		
Bentonite clay	WBM weighting chemical	E
Barite	WBM weighting chemical	E
CMC (carboxymethyl cellulose)	Viscosifier	E
Dextrid (potato starch)	Drilling fluid (fluid loss control)	E
SperSene (lignosulfonate)	Drilling fluid (thinner)	E
Soda Ash	Drilling fluid (additive)	E
Caustic Soda	Drilling fluid (acidity control)	E

4.6.3 Other Property in the Licence Area

All other wells in the WA-28-P licence area have been permanently plugged and abandoned and wellheads removed. There are no other property remaining in the licence area.

4.7 Project Vessels

The Petroleum Activities Program will be undertaken using an offshore support vessel which may be accompanied by a general support vessel. Collectively, these vessels are referred to as 'project vessels'. Specifications of a typical offshore support and general support vessel are outlined in **Table 4-6**.

Table 4-6: Typical offshore support vessel and general support vessel specifications

Component	Specification Range	
Type	General support vessel	Offshore support vessels
Accommodation (maximum persons on board)	~120 personnel	~140 personnel
Station keeping	DP2	DP2
Fuel (@ 90% capacity)	~1006 m^3	~1,619 m^3
Lube oil storage capacity	~35 m^2	~162 m^3

An offshore support vessel will be used to remove the Eaglehawk-1 wellhead and associated infrastructure. If required, a general support vessel may be used to transport equipment and materials between the Operational Area and port or to perform standby duties within the Operational Area. General support vessels are also able to assist in implementing the Oil Pollution First Strike Plan (**Appendix H**), should an environmental incident occur (e.g. spills), and may also have

additional capability, such as ROV activities, deployment of subsea equipment, monitoring and inspection.

For power generation, project vessels may use diesel-powered generators and/or LNG. All project vessels will display navigational lighting and external lighting on a 24-hour basis, 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*.

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

Project vessels will also discharge deck drainage from open drainage areas, bilge water from closed drainage areas, putrescible waste and treated sewage and grey water. Hazardous and non-hazardous waste generated are disposed of on shore.

4.7.1 Refuelling

Fuel transfers that may occur within the Operational Area include refuelling of cranes, helicopters or other equipment as required.

4.7.2 Dynamic Positioning

Project vessels will use DP for station keeping. DP uses satellite navigation and radio transponders in conjunction with thrusters to maintain position at the required location during the activity. A number of seabed transponders, which emit signals that are detected by receivers on the vessel and used to calculate position may be used to improve accuracy of vessel location. The transponders are typically deployed in an array on the seabed, using clump weights comprising concrete or using transponder stands; if used, these will be recovered at the end of the activity.

4.8 Remotely Operated Vehicles

Project vessels may be equipped with an ROV system that is maintained and operated by a specialised contractor aboard the vessel. ROVs may be used for activities such as:

- visual inspections/observations
- seabed and hazard survey
- placement of ROV tool baskets on the seabed and/or mud mats on the seabed
- marine growth cleaning of the wellhead and removal of the debris cap
- open water tool observation and guidance
- sediment relocation
- wellhead tooling and cutting
- post-well seabed survey.

4.9 Helicopters

During the Petroleum Activities Program, crew changes may be performed using helicopters as required. Helicopter operations within the Operational Area are limited to helicopter take-off and landing on the helideck.

4.10 Removal of Wellheads and Associated Infrastructure

The wellhead and associated infrastructure are planned to be removed and recovered as part of the Petroleum Activities Program. Options for removing and recovering the wellhead and guide bases are described in **Table 4-7**.

Table 4-7: Wellhead cutting methods

Method	Description	Associated Discharges	Preference
Abrasive water jet (AWJ) cutting	**Method:** 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 (>3 m) in accordance with International Well Standard practice, e.g. Oil and Gas UK Well Decommissioning Guidelines (OGUK 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 300-350 m, due to requirement for high pressure jetting. Not restricted by number of casing strings.	4t of grit and 250 L flocculant per AWJ cut (majority or all to be released below the mudline).	Preferred method given water depth within Operational Area
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 up to two casing strings (unless additional inner casings can be pulled separately prior to cut) and within all water depths. May require up to 1 m of well infrastructure to be left *in situ* above mudline due to external cut. 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 option if preferred option is unsuccessful.
Mechanical internal cutting	**Metho**d: 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 (>3 m) in accordance with international Well standard practice, e.g. Oil and Gas UK Well Decommissioning Guidelines (OGUK 2018). This may also allow for additional cut attempts. **Uses:** Suitable for wells with up to two casing strings (unless additional inner casings can be pulled separately prior to cut) where an internal cut can be achieved, and within all water depths.	N/A	Contingency option if improvements in technology allow it to become suitable for removal of guide bases

Once the wellhead and guide bases are cut, 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. Infrastructure once recovered will be transported to shore for disposal and/or recycling.

4.11 Project Fluids

All chemicals that may be operationally discharged during removal of the infrastructure 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 excludes legacy chemicals including residual fluids currently present in the wellbore, which have been assessed for discharge in **Section 7.6.6**. All previously approved plugging and drilling chemicals are included on the Woodside Drilling and Completions Chemical Assessment Register, which is reviewed, as per the Chemical Selection and Assessment Environment Guideline.

The chemical assessment process follows the principles outlined in the OCNS, which manages chemical use and discharge in the United Kingdom and the Netherlands. It applies the requirements of the Convention for the Protection of the Marine Environment of the North-East Atlantic (Oslo and Paris Commission for 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 managing chemicals.

All chemical substances listed on the OCNS ranked list of registered products have an assigned ranking based on toxicity and other relevant parameters, such as biodegradation and bioaccumulation, in accordance with one of two schemes (**Figure 4-2**):

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

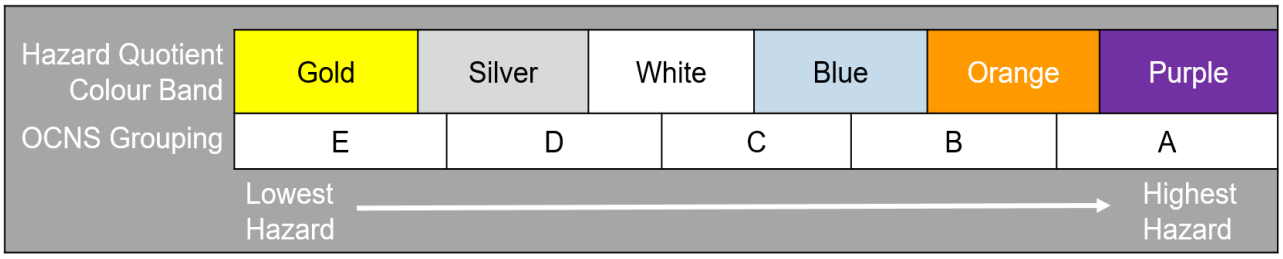


Figure 4-2: OCNS ranking scheme

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 types of chemicals that need to be assessed further to understand the environmental impacts of discharge into the marine environment are:
  - chemicals with no OCNS ranking
  - chemicals with an HQ band of white, blue, orange, purple or an OCNS ranking of A, B or C
  - chemicals with an OCNS product or substitution warning.

Further assessment includes assessing the ecotoxicity, biodegradation and bioaccumulation of the chemicals in the marine environment in accordance with the CEFAS hazard assessment and the Department of Mines and Petroleum (now Department of Mines, Industry Regulation and Safety) Chemical Assessment Guide: Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline (2013).

5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 Overview

In accordance with Regulations 13(2) and 13(3) of the Environment Regulations, this section describes the EMBA by the activity (planned and unplanned), as described in **Section 4**. As per **Section 2.4.2**, references to the Master Existing Environment, Appendix H in the Enfield Plug and Abandonment EP, have been made throughout this EP.

Woodside has identified the EMBA as the largest spatial extent where unplanned events could have an environmental consequence on the surrounding environment. For this EP, the EMBA is the potential spatial extent of surface and in-water hydrocarbons at concentrations above ecological impact thresholds, in the event of the worst-case credible spill. The ecological impact thresholds used to delineate the EMBA are defined in **Section 7.7.1**. The worst-case credible spill scenario for this EP is a vessel collision resulting in the release of marine diesel into the marine environment.

Woodside recognises that hydrocarbons may be visible beyond the EMBA at lower concentrations than the ecological impact thresholds defined in **Section 7.7.1**. 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 5-1** and described in **Table 5-1**.

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

Table 5-1: Hydrocarbon spill thresholds used to define EMBA for surface and in-water hydrocarbons

Hydrocarbon Type	EMBA[1]	Socio-cultural EMBA[1]	Planning Area for Scientific Monitoring
Surface	10 g/m^2 This represents the minimum oil thickness (0.01 mm) at which ecological impacts (e.g. to birds and marine mammals) are expected to occur.	1 g/m^2 This represents a wider area where a visible sheen may be present on the surface and, therefore, the concentration at which socio-cultural impacts to the visual amenity of the marine environment may occur. However, it is below concentrations at which ecological impacts are expected to occur. This low exposure value also establishes the planning area for scientific monitoring (NOPSEMA guidance note: A652993, April 2019).	
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 is described further in **Appendix D**: **Figure 5-1**. In the event of a spill, DNP will be notified of AMPs which may be contacted by hydrocarbons at this threshold **Table 6-1**.
Entrained	100 ppb This represents potential toxic effects, particularly sublethal effects to highly sensitive species (NOPSEMA guidance note: A652993, April 2019). As entrained		

Hydrocarbon Type	EMBA[1]	Socio-cultural EMBA[1]	Planning Area for Scientific Monitoring
	hydrocarbons are within the water column and not visible, impacts to socio-cultural receptors are associated with ecological impacts. Therefore, entrained hydrocarbons at this threshold also represent the level at which socio-cultural impacts may occur.		
Shoreline	100 g/m^2 This represents the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat.	10 g/m^2 This represents the volume where hydrocarbons may be visible on the shoreline but is below concentrations at which ecological impacts are expected to occur.	N/A

[1] *Further details including the source of the thresholds used to define the EMBA in this table are provided in* ***Section 7.7.1***

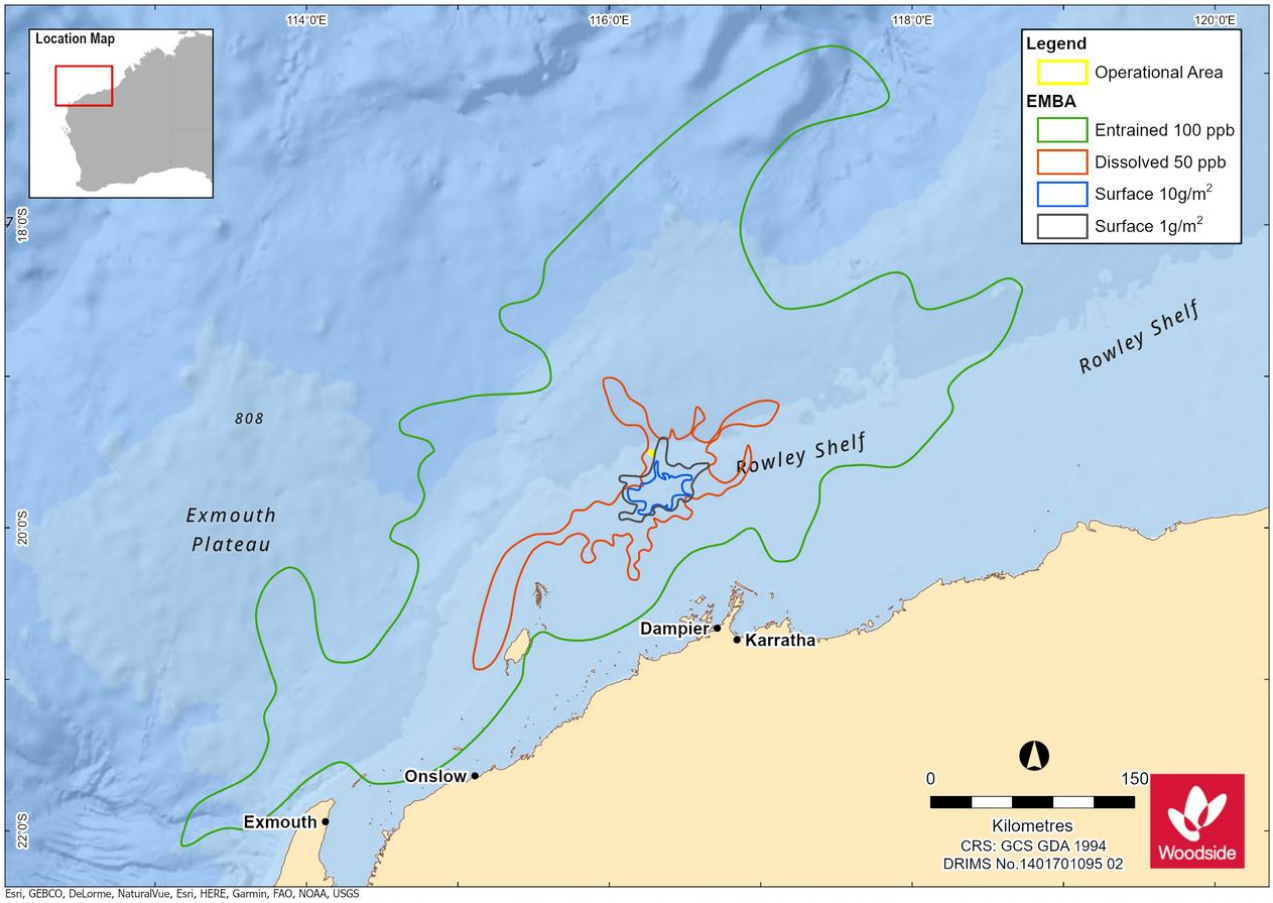


Figure 5-1: Environment that may be affected by the Petroleum Activities Program

5.2 Regional Context

The Operational Area is located in Commonwealth waters within the North-west marine region (NWMR), as defined under the Integrated Marine and Coastal Regionalisation of Australia (IMCRA v4.0) (Commonwealth of Australia, 2006), in water depths of about 120 m. Within the NWMR, the Operational Area lies within the Northwest Shelf Province (NWS Province) (**Figure 5-2**). Woodside's Existing Environment summarised the characteristics for the relevant marine bio-regions in Appendix H: Section 2 of the accepted Enfield Plug and Abandonment EP.

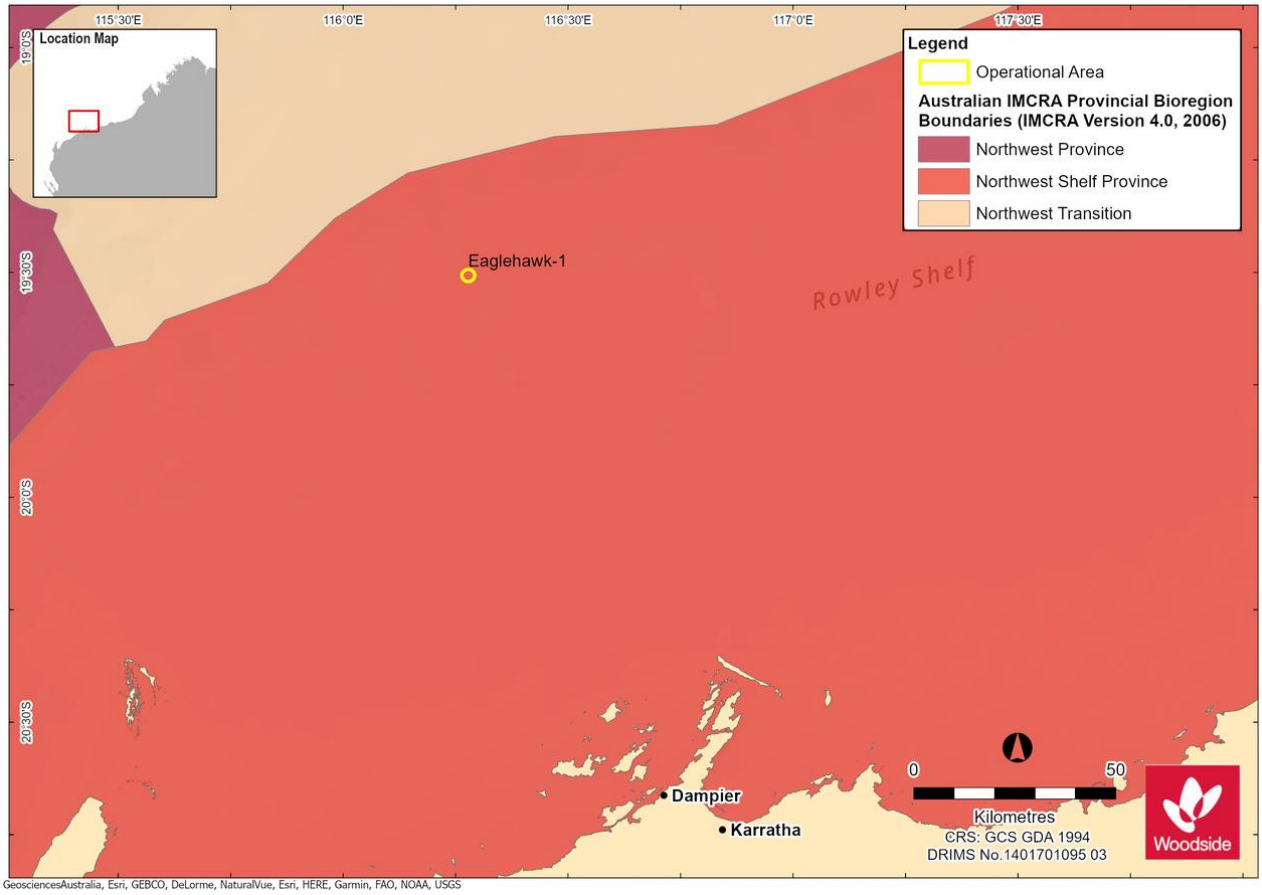


Figure 5-2: Location of the Operational Areas and relevant marine bio-regions.

5.3 Matters of National Environmental Significance (EPBC Act)

Table 5-2 and **Table 5-3** summarise the MNES overlapping the Operational Area 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 are described in detail in Appendix H: Section 3 of the accepted Enfield Plug and Abandonment EP.

Table 5-2: Summary of MNES identified by the EPBC Act Protected Matters Search Tool (PMST) as potentially occurring within the Operational Area

MNES	Number	Relevant Section
World Heritage Properties	0	N/A
National Heritage Places	0	N/A

MNES	Number	Relevant Section
Wetlands of International Importance (Ramsar)	0	N/A
Commonwealth Marine Area	1	**Section 5.8**
Listed Threatened Ecological Communities	0	N/A
Listed Threatened Species*	15	**Section 5.6** and Appendix H: Sections 3-8 of the accepted Enfield Plug and Abandonment EP
Listed Migratory Species*	31	**Section 5.6** and Appendix H: Sections 3-8 of the accepted Enfield Plug and Abandonment EP.

Table 5-3: Summary of MNES identified by the EPBC Act Protected Matters Search Tool (PMST) as potentially occurring within the EMBA

MNES	Number	Relevant Section
World Heritage Properties	1	**Section 5.9**
National Heritage Places	1	**Section 5.9**
Wetlands of International Importance (Ramsar)	0	N/A
Commonwealth Marine Area	1	**Section 5.8**
Listed Threatened Ecological Communities	0	N/A
Listed Threatened Species	38	**Section 5.6** and Appendix H: Sections 3-8 of the accepted Enfield Plug and Abandonment EP.
Listed Migratory Species	54	**Section 5.6** and Appendix H: Sections 3-8 of the accepted Enfield Plug and Abandonment EP.

5.4 Physical Environment

The Operational Area is located in Commonwealth waters within the Northwest Shelf Province (NWS) where water depths range between 0 and 200 m (DEWHA, 2008, DSEWPaC, 2012) (**Figure 5-2**). Water depths within the Operational Area are 120 m (**Figure 5-3**). The NWS is located primarily on the continental shelf between North West Cape and Cape Bougainville. It varies in width from about 50 km at Exmouth Gulf to more than 250 km off Cape Leveque and covers an area of 238,759 km^2 (DEWHA, 2008).

A section of the Ancient Coastline at 125 m Depth Contour KEF also overlaps the Operational Area. Areas of this KEF comprise rocky hard substrate, which may occur within the Operational Area; however, the area is predominantly made up of soft sediment (see **Section 5.7**).

Broad-scale surveys around the Operational Area confirm that the seabed is flat and relatively featureless with few areas of hard substrate or outcrops, except in areas within the Ancient Coastline at 125 m Depth Contour KEF. The seabed in the vicinity of the North Rankin Complex (approximately 12 km west of the Operational Area) is typical of deeper offshore areas (>150 m water depth) on the NWS, being characterised by deep (>5 m) soft, silty sediments derived primarily from calcium carbonate, which become deeper, softer and finer with increasing depth. In the vicinity of the Angel Platform (approximately 39 km east of the Operational Area) the majority of sediments are expected to be comprised primarily of fine sands, very fine sands and silt. Coarse material, in particular marine-derived sediments with high carbonate content and gravels of weathered coralline algae and shells associated with the Glomar Shoals (McLoughlin and Young 1985) may also be present (located 24 km from the Operational Area).

Sediments within the Operational Area are expected to be broadly consistent with those in the NWS, with typically low levels of potential contaminants of geogenic origin (often below laboratory limits of

detection) (AIMS, 2014). Sediments in the outer NWS are relatively homogenous and are typically dominated by sands and a small portion of gravel (Baker et al. 2008). Fine sediment size classes (e.g. muds) increase with proximity to the shoreline and the shelf break but are less prominent in the intervening continental shelf (Baker et al. 2008). Carbonate sediments typically account for the bulk of sediment composition, with both biogenic and precipitated sediments present on the outer shelf (Dix et al. 2005). Beyond the shelf break, the proportion of fine sediments increases along the continental slope towards the Exmouth Plateau and the abyssal plain (Baker et al. 2008).

The majority of sediments within the Operational Area are expected to be comprised primarily of fine sands, very fine sands and silt, similar to those analysed in the surrounds of the Goodwyn A facility, approximately 22 km south-west of the Operational Area (BMT Oceanica 2015). Coarse material, in particular marine-derived sediments with high carbonate content and gravels of weathered coralline algae and shells associated with the Glomar Shoals (McLoughlin and Young 1985), may also be present in the Operational Area.

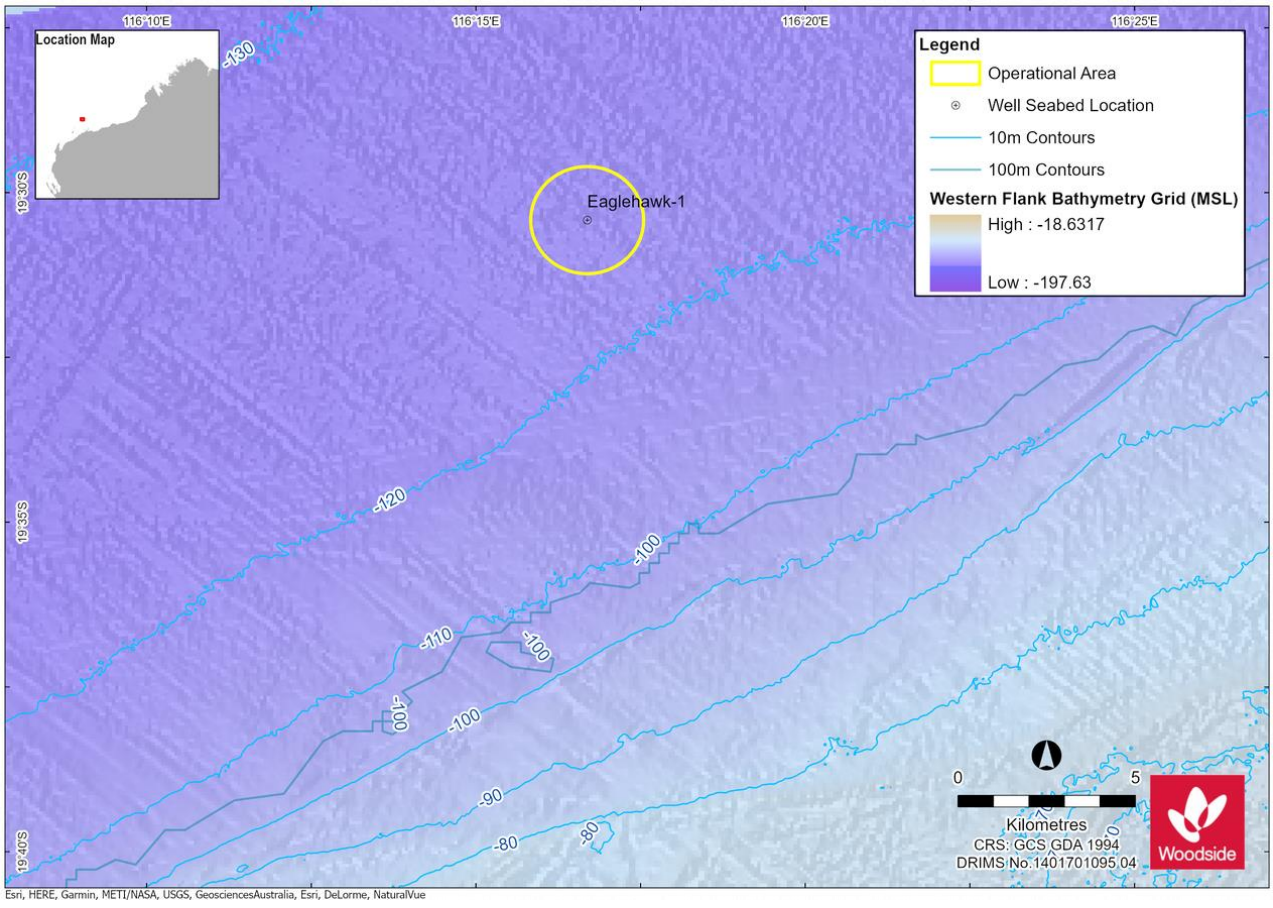


Figure 5-3: Bathymetry of the Operational Area

Appendix H: Section 2 of the accepted Enfield Plug and Abandonment EP provides a summary of the physical characteristics of the environment within the EMBA.

5.5 Habitats and Biological Communities

Given the Operational Area is expected to consist primarily of sandy substrate and soft sediments (see **Section 5.4**) and bathymetric surveys within the Operational Area show the seabed is relatively flat and featureless, communities in the area are expected to largely consist of low density sessile benthic biota and mobile epifauna. Pelagic species such as fish, sharks, turtles and cetaceans may also transit the area.

Key habitats and ecological communities within the EMBA are identified in **Table 5-4** and described in Appendix H: Section 4 of the accepted Enfield Plug and Abandonment EP**.**

Table 5-4: Habitats and communities within the EMBA

Habitat/Community	Key locations within the EMBA and Distance from Operational Area
Marine primary producers	
Coral	• Glomar Shoals (31 km east) • Rankin Bank (69 km south-west) • Montebello Island group (113 km south-west) • Lowendal Island group (132 km south-west) • Barrow Island (146 km south-west) • Ningaloo Coast world heritage area (WHA) (incl. Muiron Islands) (299 km south-west) • Rowley Shoals – Imperieuse Reef (330 km north-east) • Shark Bay (640 km south-west) • Scott Reef – Seringapatam Reef (826 km north-east). Coral reef habitats within the EMBA are described in Appendix H: Section 4.5 of the accepted Enfield Plug and Abandonment EP.
Seagrass beds and macroalgae	• Glomar Shoal (31 km east) • Rankin Bank (69 km south-west) • Montebello Islands (113 km south-west) Seagrass beds and macroalgae are described in Appendix H: Section 4.5 of the accepted Enfield Plug and Abandonment EP.
Mangroves	These coastal habitats are not found within the Operational Area or EMBA.
Other communities and habitats	
Plankton	Phytoplankton within the Operational Area and EMBA is expected to reflect the distribution and abundance of the NWMR. Refer to Appendix H: Section 4.3 of the accepted Enfield Plug and Abandonment EP**.**
Pelagic and demersal fish populations	Fish populations within the Operational Areas and EMBA are expected to reflect the distribution and abundance of the NWMR. Refer to Appendix H: Section 5.5 of the accepted Enfield Plug and Abandonment EP**.**
Epifauna and infauna	Epifauna and infauna within the Operational Area and EMBA is expected to reflect the distribution and abundance of the NWMR. Refer to Appendix H: Section 5.5 of the accepted Enfield Plug and Abandonment EP**.**

5.6 Protected Species

A total of 62 EPBC Act species listed threatened, migratory, or both threatened and migratory, considered to be MNES were identified as potentially occurring within the EMBA, of which a subset of 31 species were identified as potentially occurring within the Operational Area. The full list of marine species identified from the PMST report(s) is provided in **Appendix C**, including several MNES that are not considered to be credibly impacted (e.g. terrestrial species within the EMBA). Two conservation dependent species have been identified with a potential to occur within the Operational Area and EMBA; the southern bluefin tuna and scalloped hammerhead shark. Species identified as potentially occurring within the Operational Area and EMBA and Biologically Important Areas (BIAs) or Habitat Critical to their Survival (Habitat Critical) which overlap the Operational Area and EMBA are listed in **Table 5-5** to **Table 5-13**, and a description of species is included in Appendix H: Section 5 – Section 8 of the accepted Enfield Plug and Abandonment EP. **Figure 5-4** to **Figure 5-7** show the spatial overlap with relevant BIAs and Habitat Critical areas and the Operational Area and EMBA.

5.6.1 Fish, Sharks and Rays

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

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				Operational Area	***EMBA***
Carcharodon carcharias	White Shark	Vulnerable	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Pristis zijsron	Green Sawfish	Vulnerable	Migratory	Species or species habitat known to occur within area	Species or species habitat known to occur within area
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
Anoxypristis cuspidata	Narrow Sawfish	N/A	Migratory	Species or species habitat may 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
Isurus oxyrinchus	Shortfin Mako	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Isurus paucus	Longfin Mako	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Manta alfredi	Reef Manta Ray	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Manta birostris	Giant Manta Ray	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	
				Operational Area	***EMBA***
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	Vulnerable	N/A	N/A	Species or species habitat known to occur within area
Pristis clavata	Dwarf Sawfish	Vulnerable	N/A	N/A	Species or species habitat known to occur within area
Milyeringa veritas	Blind Gudgeon	Vulnerable	N/A	N/A	Species or species habitat may occur within area

Table 5-6: Fish, shark and ray BIAs within the Operational Area and EMBA

Species	BIA type	Approximate Distance and Direction of BIA from Operational Area (km)
Whale Shark	Foraging (northward from Ningaloo along 200 m isobath)	Overlaps

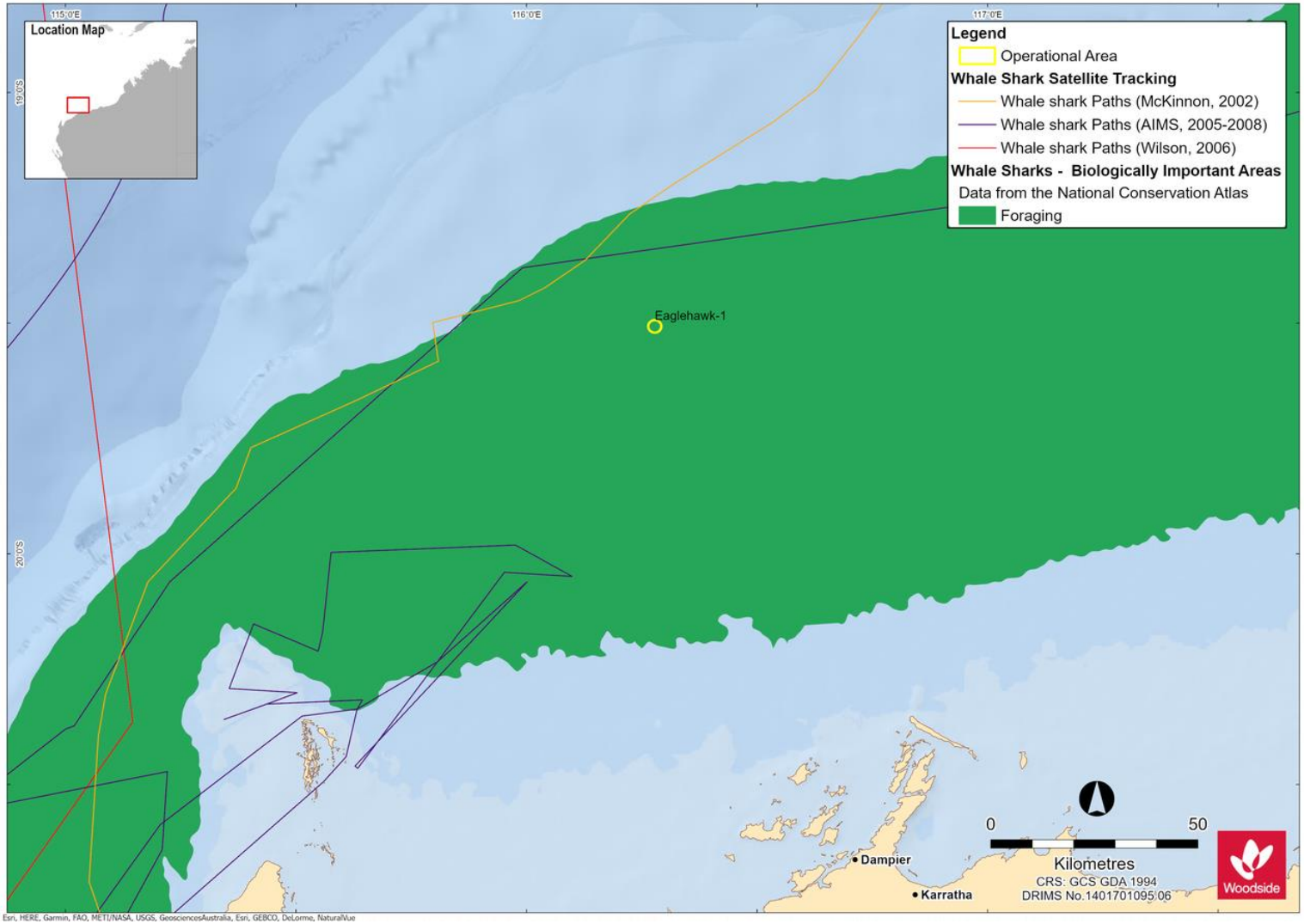


Figure 5-4: Whale Shark BIAs overlapping the Operational Area and EMBA and satellite tracks of whale sharks tagged between 2005 and 2008 (Meekan and Radford 2010)

5.6.2 Marine Reptiles

Table 5-7: Threatened and Migratory marine reptile species predicted to occur within the Operational Area and EMBA

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				Operational Area	***EMBA***
Caretta caretta	Loggerhead Turtle	Endangered	Migratory	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas	Green Turtle	Vulnerable	Migratory	Species or species habitat likely to occur within area	Breeding known to occur within area
Dermochelys coriacea	Leatherback Turtle	Endangered	Migratory	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
Eretmochelys imbricata	Hawksbill Turtle	Vulnerable	Migratory	Species or species habitat likely to occur within area	Breeding known to occur within area
Natator depressus	Flatback Turtle	Vulnerable	Migratory	Species or species habitat likely to occur within area	Breeding known to occur within area
Aipysurus apraefrontalis	Short-nosed Seasnake	Critically Endangered	N/A	N/A	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 5-8: Marine turtle BIAs within the EMBA

Species	BIA type	Approximate Distance and Direction of BIA from Operational Area (km)
Flatback turtle	Internesting (Thevernard Island - South coast, Montebello Islands, Dixon Island, Intercourse Island, Dampier Archipelago, Legendre Island, Huay Island, Delambre Island, West of Cape Lambert)	40 km SSW
Green turtle	Internesting (North West Cape, Muiron Islands, Montebello Islands, Barrow Island)	93 km SW
	Nesting (North West Cape, Barrow Island)	150 km SW
	Foraging (Montebello Islands, Barrow Island,	130 km SW
	Mating (Montebello Islands)	130 km SW
	Aggregation (Montebello Islands)	130 km SW
Hawksbill turtle	Internesting (Ningaloo coast and Jurabi coast, Thevenard Island, Barrow Island, Lowendal Islands, Montebello Islands, Varanus Island Ah chong and South East Island)	98 km SW
	Nesting (Ningaloo coast and Jurabi coast, Thevenard Island, Barrow Island, Varanus Island, Lowendal Islands)	120 km SW
	Foraging (Montebello Islands)	120 km SW
	Mating (Montebello Islands)	120 km SW
Loggerhead turtle	Internesting (Ningaloo coast and Jurabi coast, Muiron Islands, Montebello Islands)	107 km SW

Table 5-9: Internesting Habitat Critical to the Survival of Marine Turtle Species predicted to occur within EMBA

Species	Genetic Stock	Nesting Locations	Approximate Distance and Direction from Operational Area (km)	Inter-nesting buffer	Nesting period	Hatching period
Green turtle	North West Cape	Dampier Archipelago, Barrow Island, Montebello Islands, Serrier Island and Thevenard Island, Exmouth Gulf and Ningaloo coast.	100 km SW	20 km	Nov–Mar	Jan–May (peak: Feb–Mar)

Species	Genetic Stock	Nesting Locations	Approximate Distance and Direction from Operational Area (km)	Inter-nesting buffer	Nesting period	Hatching period
Loggerhead turtle	Western Australia	Exmouth Gulf and Ningaloo coast.	326 km SW	20 km	Nov–May (peak: Jan)	Jan–May
Flatback turtle	Pilbara	Dampier Archipelago, including Delambre Island and Hauy Island, Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island.	50 km S	60 km	Oct–Mar (peak: Feb-Mar)	Oct–Mar
Hawksbill turtle	Western Australia	Dampier Archipelago, including Delambre Island and Rosemary Island, Cape Preston to mouth of Exmouth Gulf including Montebello Islands and Lowendal Islands.	90 km S	20 km	All year (peak: Oct–Feb)	All year (peak: Dec–Feb)
Leatherback turtle	No overlap – nesting located in Northern Territory and North Queensland					
Olive Ridley turtle	No overlap – nesting located in Northern Australia and North Queensland					

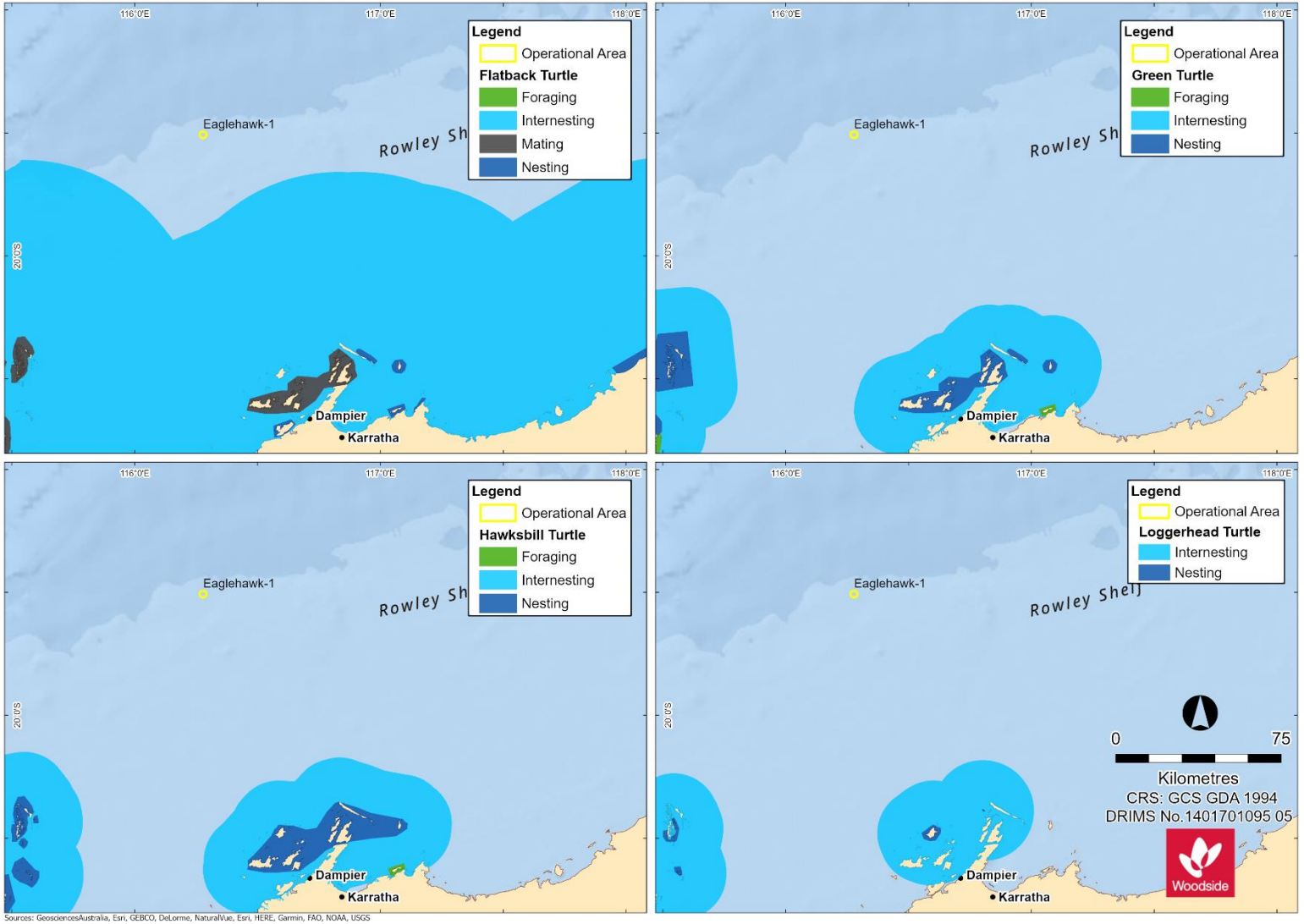


Figure 5-5: Marine reptile BIAs overlapping the EMBA

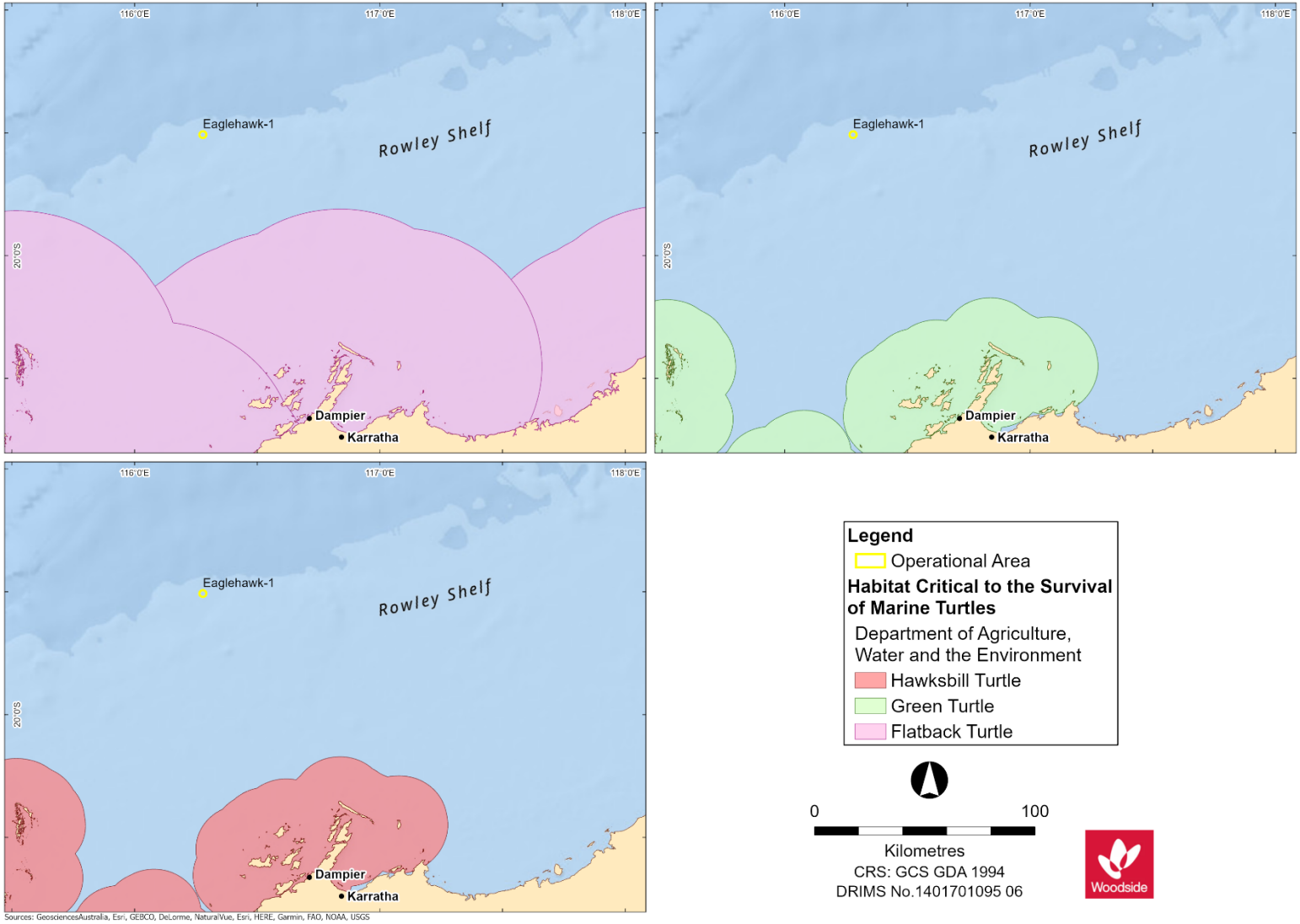


Figure 5-6: Habitat Critical to the Survival of Marine Turtles overlapping the EMBA

5.6.3 Marine Mammals

Table 5-10: Threatened and Migratory marine mammal species predicted to occur within the Operational Area and EMBA

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				Operational Area	***EMBA***
Balaenoptera borealis	Sei Whale	Vulnerable	Migratory	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus	Blue Whale	Endangered	Migratory	Species or species habitat likely to occur within area	Migration route known to occur within area
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	Vulnerable	Migratory	Species or species habitat known to occur within area	Breeding known to occur within area
Balaenoptera edeni	Bryde's Whale	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat likely to 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
Physeter macrocephalus	Sperm Whale	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Tursiops aduncus	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
Eubalaena australis	Southern Right Whale	Endangered	Migratory	N/A	Species or species habitat likely to occur within area

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				Operational Area	***EMBA***
Balaenoptera bonaerensis	Antarctic Minke Whale	N/A	Migratory	N/A	Species or species habitat likely to occur within area
Dugong dugon	Dugong	N/A	Migratory	N/A	Species or species habitat known to occur within area
Sousa chinensis	Indo-Pacific Humpback Dolphin	N/A	Migratory	N/A	Species or species habitat likely to occur within area

Table 5-11: Marine mammal BIAs within the EMBA

Species	BIA type	Approximate Distance and Direction from Operational Area (km)
Humpback whale	Migration (north and south)	40 km S

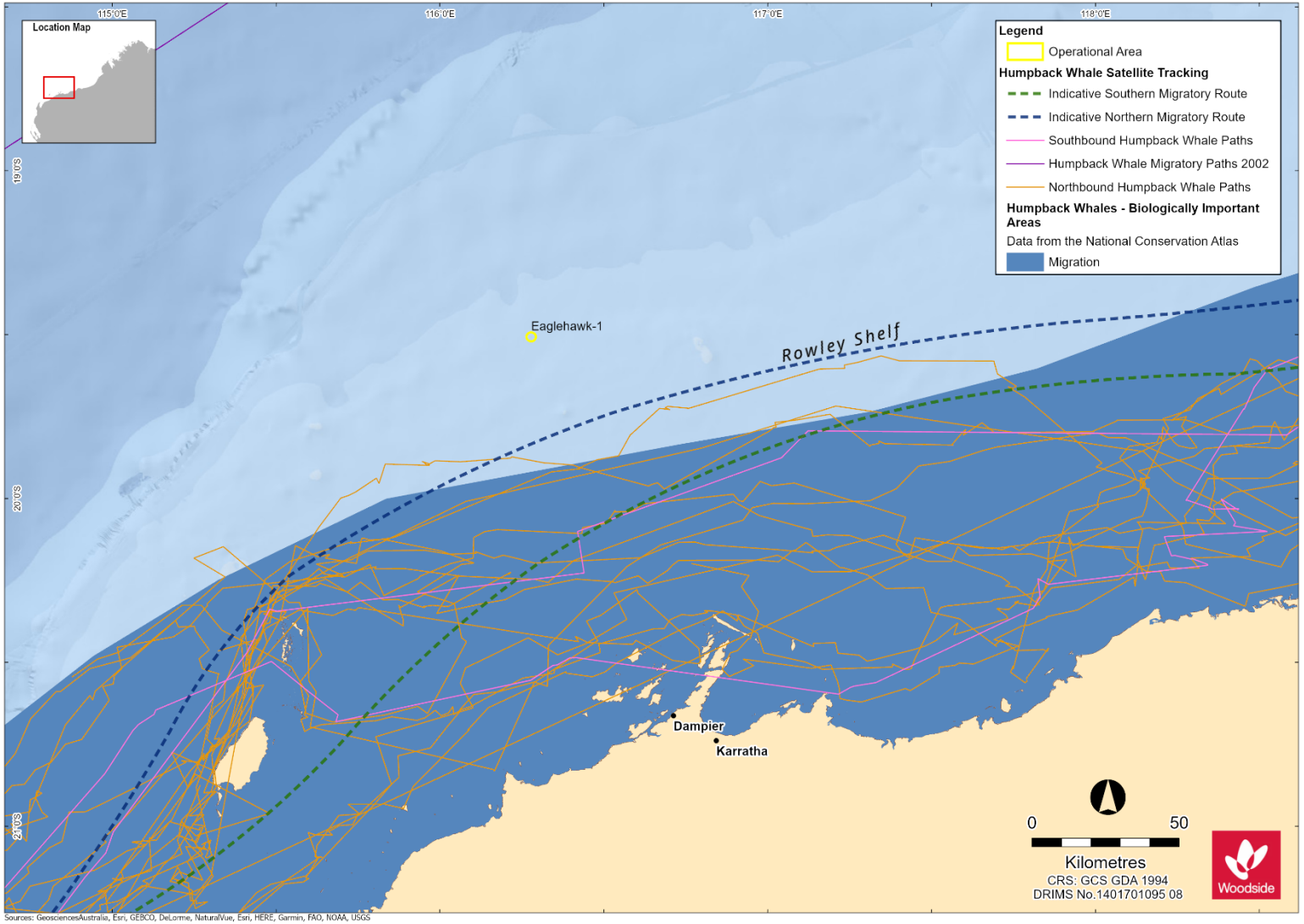


Figure 5-7: Humpback whale BIAs overlapping the EMBA

5.6.4 Seabirds and Migratory Shorebirds

Table 5-12: Threatened and Migratory seabird and migratory shorebird species predicted to occur within the Operational Area and EMBA

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				Operational Area	***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
Numenius madagascariensis	Eastern Curlew	Critically endangered	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Sternula nereis nereis	Australian Fairy Tern	Vulnerable	N/A	Species or species habitat may occur within area	Breeding known to occur within area
Anous stolidus	Common Noddy	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Calonectris leucomelas	Streaked Shearwater	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Fregata ariel	Lesser Frigatebird, Least Frigatebird	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Fregata minor	Great Frigatebird, Greater Frigatebird	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area
Actitis hypoleucos	Common Sandpiper	N/A	Migratory	Species or species habitat may occur within area	Species or species habitat known to occur within area
Calidris melanotos	Pectoral Sandpiper	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	
				Operational Area	***EMBA***
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	N/A	N/A	Species or species habitat known to occur within area
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	Critically Endangered	N/A	N/A	Species or species habitat known to occur within area
Macronectes giganteus	Southern Giant-Petrel	Endangered	N/A	N/A	Species or species habitat may occur within area
Malurus leucopterus edouardi	White-winged Fairy-wren (Barrow Island)	Vulnerable	N/A	N/A	Species or species habitat likely to occur within area
Papasula abbotti	Abbott's Booby	Endangered	N/A	N/A	Species or species habitat may occur within area
Pterodroma mollis	Soft-plumaged Petrel	Vulnerable	N/A	N/A	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis	Australian Painted Snipe	Endangered	N/A	N/A	Species or species habitat may occur within area
Thalassarche impavida	Campbell Albatross	Vulnerable	N/A	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

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				Operational Area	***EMBA***
Ardenna carneipes	Flesh-footed Shearwater	N/A	Migratory	N/A	Species or species habitat likely to occur within area
Ardenna pacifica	Wedge-tailed Shearwater	N/A	Migratory	N/A	Breeding known to occur within area
Hydroprogne caspia	Caspian Tern	N/A	Migratory	N/A	Breeding known to occur within area
Macronectes giganteus	Southern Giant-Petrel	Endangered	Migratory	N/A	Species or species habitat may occur within area
Onychoprion anaethetus	Bridled Tern	N/A	Migratory	N/A	Breeding known to occur within area
Phaethon lepturus	White-tailed Tropicbird	N/A	Migratory	N/A	Foraging, feeding or related behaviour likely to occur within area
Sterna dougallii	Roseate Tern	N/A	Migratory	N/A	Breeding known to occur within area
Thalassarche impavida	Campbell Albatross	N/A	Migratory	N/A	Species or species habitat may occur within area
Charadrius veredus	Oriental Plover	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

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				Operational Area	*EMBA*
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
Thalasseus bergii	Greater Crested Tern	N/A	Migratory	N/A	Breeding known to occur within area

Table 5-13: Seabird and shorebird BIAs within the EMBA

Species	BIA type	Approximate Distance and Direction from Operational Area (km)
Wedge-tailed Shearwater	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	3 km SW
Fairy Tern	Breeding (Pilbara and Gascoyne coasts and islands)	136 km SW
	Foraging (Ningaloo Marine Park)	113 km SW
Lesser Crested Tern	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	115 km SW
Lesser Frigatebird	Breeding (Kimberley and Pilbara coasts and islands also Ashmore Reef)	193 km E
Roseate Tern	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	113 km SW
White-tailed Tropicbird	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	260 km E

5.6.5 Seasonal Sensitivities for Protected Species

Periods of the year where the Operational Area may overlap seasonally important habitat (e.g. for nesting, breeding, foraging, or migration) in the EMBA for protected species are presented in **Table 5-14**. Movement patterns of all protected species identified in **Section 5.6** are described in Appendix H: Section 5 of the accepted Enfield Plug and Abandonment EP.

Table 5-14: Key seasonal sensitivities for protected migratory species identified as occurring within the Operational Area.

Species	January	February	March	April	May	June	July	August	September	October	November	December
Fish, sharks and rays												
Whale Shark - Foraging (northward from Ningaloo along 200 m isobath)												
Seabirds												
Fairy Tern - breeding												
Lesser Crested Tern												
Lesser Frigatebird												
Roseate Tern												
Wedge-tailed Shearwater												
White-tailed Tropicbird												
Marine mammals												
Humpback whale – north migration												
Humpback whale – southern migration												
Marine reptiles												
Flatback turtle – nesting and hatchling emergence												
Green turtle– nesting and hatchling emergence												
Hawksbill turtle– nesting and hatchling emergence												
Loggerhead turtle– nesting and hatchling emergence												
	Species may be present in the Operational Area											
	Peak period. Presence of animals is reliable and predictable each year											

References for species seasonal sensitivities: Conservation Values Atlas, 2021

5.7 Key Ecological Features (KEFs)

The Ancient coastline at 125 m depth contour KEF overlaps the Operational Area. KEFs within the Operational Area and EMBA are identified in **Table 5-15. Figure 5-8** shows the spatial overlap with KEFs and the Operational Area and EMBA.

Table 5-15: KEFs within the Operational Area and EMBA.

Key Ecological Feature	Distance and Direction from Operational Area to KEF (km)
Ancient coastline at 125 m depth contour	Overlaps
Glomar Shoals	31 km SE
Continental Slope Demersal Fish Communities	82 km W
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	277 km SW
Commonwealth waters adjacent to Ningaloo Reef	335 km SW

The Ancient Coastline at 125 m depth contour KEF is described below in **Section 5.7.1** and the remaining KEFs that intersect with the EMBA are described in Appendix H: Section 9 of the accepted Enfield Plug and Abandonment EP.

5.7.1 Ancient Coastline at 125 m depth contour

Several steps and terraces as a result of Holocene sea level changes occur in the region with the most prominent of these features occurring as an escarpment along the Northwest Shelf and Sahul Shelf at a water depth of 125 m, which forms the Ancient Coastline at 125 m depth contour KEF (the ancient coastline). The ancient coastline overlaps the Operational Area. The ancient coastline is not continuous throughout the Northwest Shelf and coincides with a well-documented eustatic still stand at approximately 130 m worldwide (Falkner et al., 2009).

Where the ancient coastline provides areas of hard substrate, it may contribute to higher diversity and enhanced species richness relative to soft sediment habitat (DSEWPaC 2012). 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).

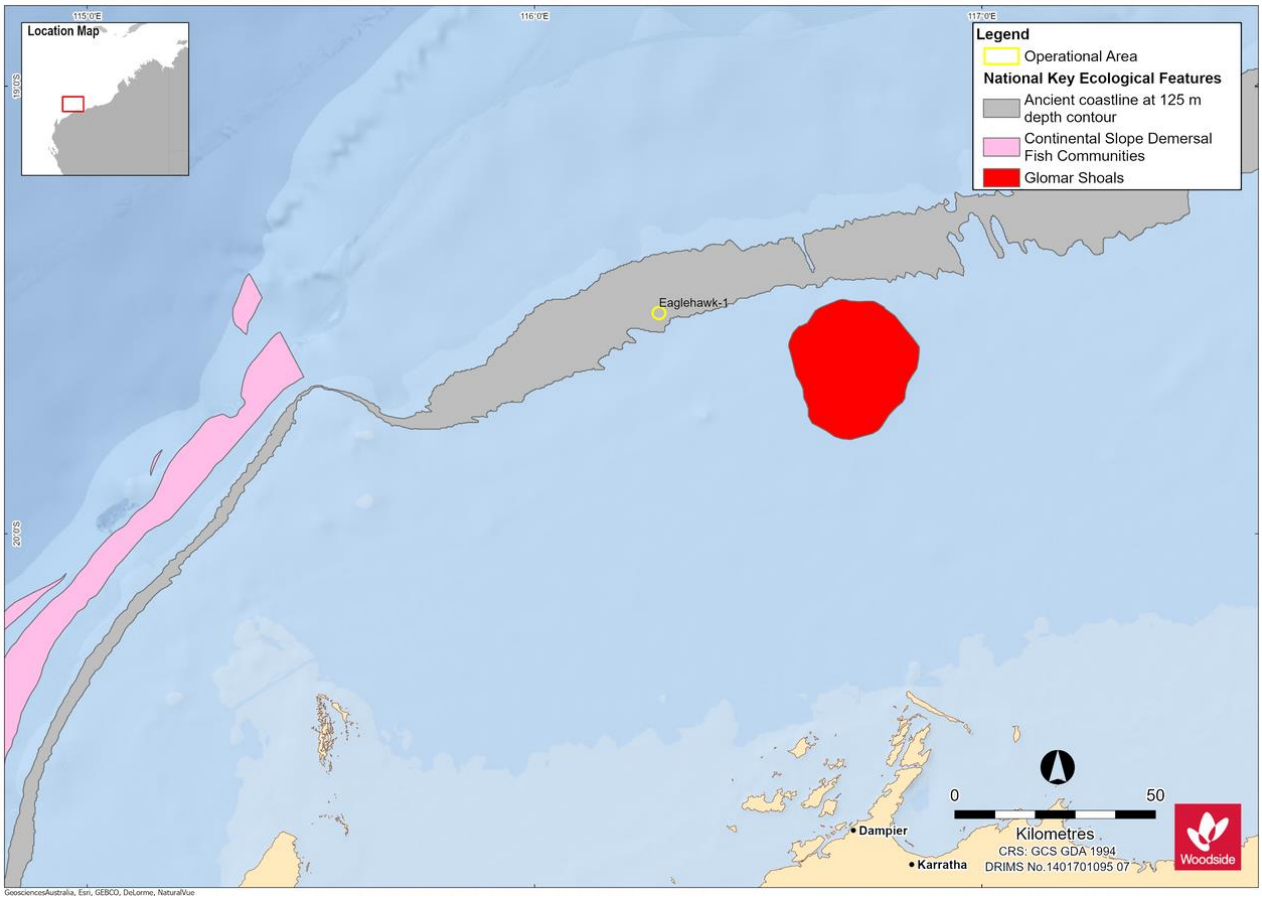


Figure 5-8: KEFs overlapping the Operational Area and EMBA

5.8 Protected Places

No protected places overlap the Operational Area. Protected places within the EMBA are identified in **Table 5-16** and presented in **Figure 5-9.** Appendix H: Section 10 of the accepted Enfield Plug and Abandonment EP outlines the values and sensitivities of protected places and other sensitive areas in the Operational Area and EMBA.

Table 5-16: Established protected places and other sensitive areas overlapping the EMBA

	Distance and Direction from Operational Area to protected place or sensitive area (km)	IUCN category* or relevant park zone overlapping the Operational Area and/or EMBA
AMPs		
NWMR		
Argo-Rowley Terrace Marine Park	195 km NE	Multiple Use Zone (IUCN VI)
Montebello Marine Park	71 km SW	Multiple Use Zone (IUCN VI)
Gascoyne Marine Park	349 km SW	Multiple Use Zone (IUCN VI)
Ningaloo Marine Park	335 km SW	Recreational Use Zone (IUCN IV)
State Marine Parks and Nature Reserves		
Marine Parks		
Montebello Islands Marine Park	114 km SW	VI
Montebello Islands Conservation Park	114 km SW	II

	Distance and Direction from Operational Area to protected place or sensitive area (km)	IUCN category* or relevant park zone overlapping the Operational Area and/or EMBA
Barrow Island Marine Park	140 km SW	VI
Marine Management Areas		
Barrow Island Marine Management Area	140 km SW	IV
Muiron Islands Marine Management Area	114 km SW	IV
Nature Reserves		
Barrow Island Nature Reserve	140 km SW	Ia
Bessieres Island Nature Reserve	272 km SW	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

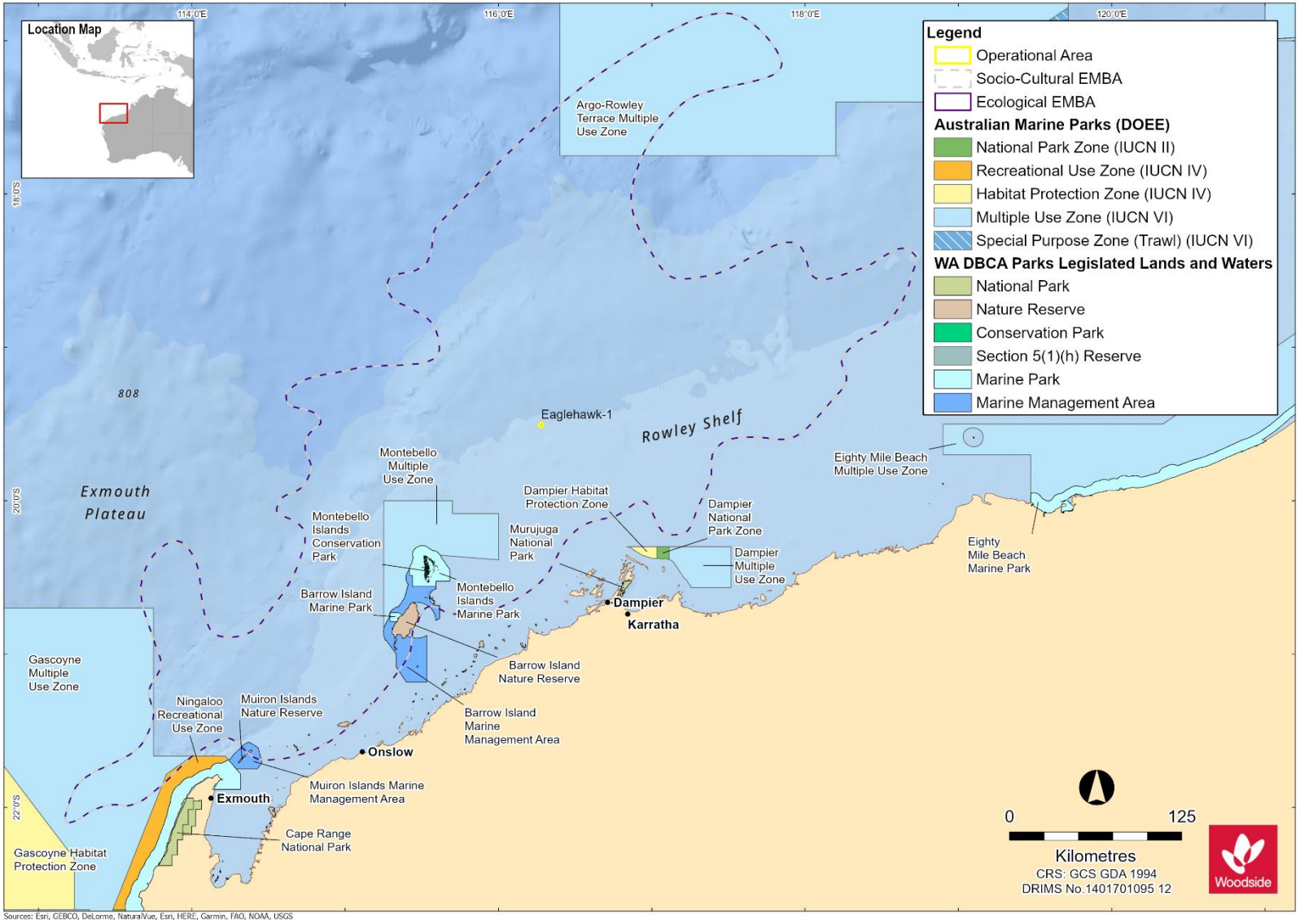


Figure 5-9: Protected Areas overlapping the EMBA

5.9 Socio-Economic Environment

5.9.1 Cultural Heritage

5.9.1.1 European Sites of Significance

There are no known sites of European cultural heritage significance within the Operational Area. Appendix H: Section 11 of the accepted Enfield Plug and Abandonment EP describes cultural heritage sites within the EMBA.

5.9.1.2 Indigenous Sites of Significance

Indigenous Australian people have a strong continuing connection with the area that extends back some 50,000 years. Woodside acknowledges this unique connection between Aboriginal peoples and the land and sea in which the company operates. Woodside also understands that while marine resources used by Indigenous people is generally limited to coastal waters for activities such as fishing, hunting and maintenance of culture and heritage, many Aboriginal groups have a direct cultural interest in decisions affecting the management of deeper offshore waters.

The longstanding relationship between Aboriginal people and the land and sea is prevalent in Indigenous culture today and Indigenous heritage places including archaeological sites which are protected under the *Aboriginal Heritage Act 1972* (WA) or EPBC Act.

The Department of Aboriginal Affairs (DAA) Heritage Inquiry System was searched for the EMBA, which indicated zero registered Indigenous heritage places (**Appendix G**). The exact location, access and traditional practices for a number of these sites are not disclosed and if required, such as in the event of a major oil spill, would involve prioritising further consultation with key contacts within DAA and relevant local Aboriginal communities.

5.9.1.3 Underwater Heritage

A search of the Australian National Shipwreck Database, which records all known Maritime Cultural Heritage (shipwrecks, aircraft, relics and other underwater cultural heritage) in Australian waters indicated that there are no sites within the Operational Area, however, a number of shipwrecks exist within the EMBA.

5.9.1.4 World, National and Commonwealth Heritage Listed Places

No listed heritage places overlap the Operational Area. World, National and Commonwealth heritage places within the EMBA are identified in **Table 5-17**. Appendix H: Section 11.2 of the accepted Enfield Plug and Abandonment EP outlines the values and sensitivities of these places.

Table 5-17: World, National and Commonwealth Heritage Listed Places within the EMBA

Listed Place	Distance and Direction from Operational Area to Listed Place (km)
World Heritage Places (WHP)	
The Ningaloo Coast	350 km SW
National Heritage Places (NHP)	
The Ningaloo Coast	350 km SW

5.9.2 Commercial Fisheries

A number of Commonwealth and State fishery management areas are located within the Operational Area and EMBA. Fish Cube data were requested to analyse the potential for interaction of fisheries with the Operational Area, 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], 2021). **Table 5-18** provides an assessment of the potential interaction and Appendix H: Section 11.5 of the accepted Enfield Plug and Abandonment EP provides further detail on the fisheries that have been identified through desk-based assessment and consultation (**Section 6**). In summary, there is a potential for interactions with vessels from two State fisheries and the proposed Petroleum Activities Program.

Table 5-18: Commonwealth and State commercial fisheries overlapping the Operational Area

Fishery name	Potential for interaction within Operational Area	
Commonwealth Managed Fisheries		
Western Tuna and Billfish Fishery	×	Fishing effort occurs in offshore waters between Carnarvon and south-west Australia, more than 800 km south of the Operational Area. While there is an overlap with the fishery management area, Woodside considers there to be no potential for interaction given the current distribution of fishing effort.
Western Skipjack Fishery	×	No active vessels operating since 2009; and the only fishing occurring in 2008-2009 was offshore South Australia. While there is an overlap with the fishery management area, Woodside considers there to be no potential for interaction given the current fishing effort.
Southern Bluefin Tuna Fishery	×	Fishing effort for the Southern Bluefin Tuna Fishery occurs in the Great Australian Bight and north-east of Eden in New South Wales. While there is an overlap with the fishery management area, Woodside considers there to be no potential for interaction given the current distribution of fishing effort.
State Managed Fisheries		
Pilbara Trap Limited Entry Fishery	✓	Fish Cube data indicates that up to five vessels were active in 2017, and less than three vessels in 2018 and 2019, in the 60 nm grid that includes the Operational Area. Total weight of catch over the last five years is approximately 40 tonnes. Given this, there is potential for interaction within the Operational Area during the Petroleum Activities Program.
Pilbara Line Fishery	✓	Fish Cube data indicates that three or fewer vessels were active between 2016 and 2019 in the 60 nm grid that includes the Operational Area. Total weight of catch over the last five years is approximately 310 tonnes. Given this, there is potential for interaction within the Operational Area during the Petroleum Activities Program.
Abalone Fishery	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021). Since dive methods are not conducive to water depths of the Operational Area and the target species have a largely temperate distribution, interaction in the Operational Area are not expected.
Mackerel Managed Fishery	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021) and, therefore, interactions are not expected.
Specimen Shell Fishery	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021). Water depths in the Operational Area are not conducive for this fishery (typically ~30 m) meaning that there is no potential for interaction.
Onslow Prawn Fishery	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021) meaning interactions in the Operational Area are not expected.
Pilbara Fish Trawl Fishery	×	The Operational Area occurs within Schedule 3, Zone 2, Area 6 of the Pilbara Fish Trawl Fishery. This area is currently closed to trawling and therefore no interaction with fishing vessels are expected.
Pilbara Crab Fishery	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021) meaning that there is no potential for interaction in the Operational Area.

Fishery name	Potential for interaction within Operational Area	
Marine Aquarium Fishery	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021). Water depths in the Operational Area are not conducive for this fishery (typically ~30 m) and, therefore, interactions are not expected.
West Coast Deep Sea Crustacean	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021) and, therefore, interactions are not expected.
North Coast Shark Fishery	×	The Operational Area overlaps the fishery; however no fishing has been allowed under the fishery since 2008/2009 (DPIRD, 2021).
Pearl Oyster Fishery	×	Fish Cube data indicates that the fishery has not been active in the Operational Area within the last five years (DPIRD, 2021). As a dive-based fishery, waters are typically not conducive for this fishery and no interaction in the Operational Area is predicted.

Fisheries not overlapping with the Operational Area but occurring within the EMBA and socio-cultural EMBA are described in Appendix H: Section 11.5.1 of the accepted Enfield Plug and Abandonment EP and include the:

- Western Australian Sea Cucumber Fishery
- Western Deepwater Trawl Fishery
- North-west Slope Trawl Fishery
- Exmouth Gulf Prawn Limited Entry Fishery
- Nickol Bay Prawn Limited Entry Fishery
- South-West Coast Salmon Fishery
- West Coast Deep Sea Crustacean Managed Fishery
- West Coast Rock Lobster Managed Fishery.

5.9.3 Traditional Fisheries

There are not expected to be any traditional fisheries that operate within the Operational Area or EMBA. This is because traditional fisheries are typically restricted to coastal waters and/or areas with suitable fishing structures such as reefs.

5.9.4 Tourism and Recreation

Given the depth of the Operational Area and distance from shore, recreational fishing and tourism are not expected.

5.9.5 Commercial Shipping

The Australian Maritime Safety Authority (AMSA) has introduced a network of marine fairways across the NWMR off WA to reduce the risk of vessel collisions with offshore infrastructure. It is noted that none of these fairways intersect with the Operational Area; the nearest fairway is approximately 43 km west of Operational Area (**Figure 5-10**). Although shipping fairways do not overlap the Operational Area, vessel tracking data suggest moderate shipping density occurs immediately to the east.

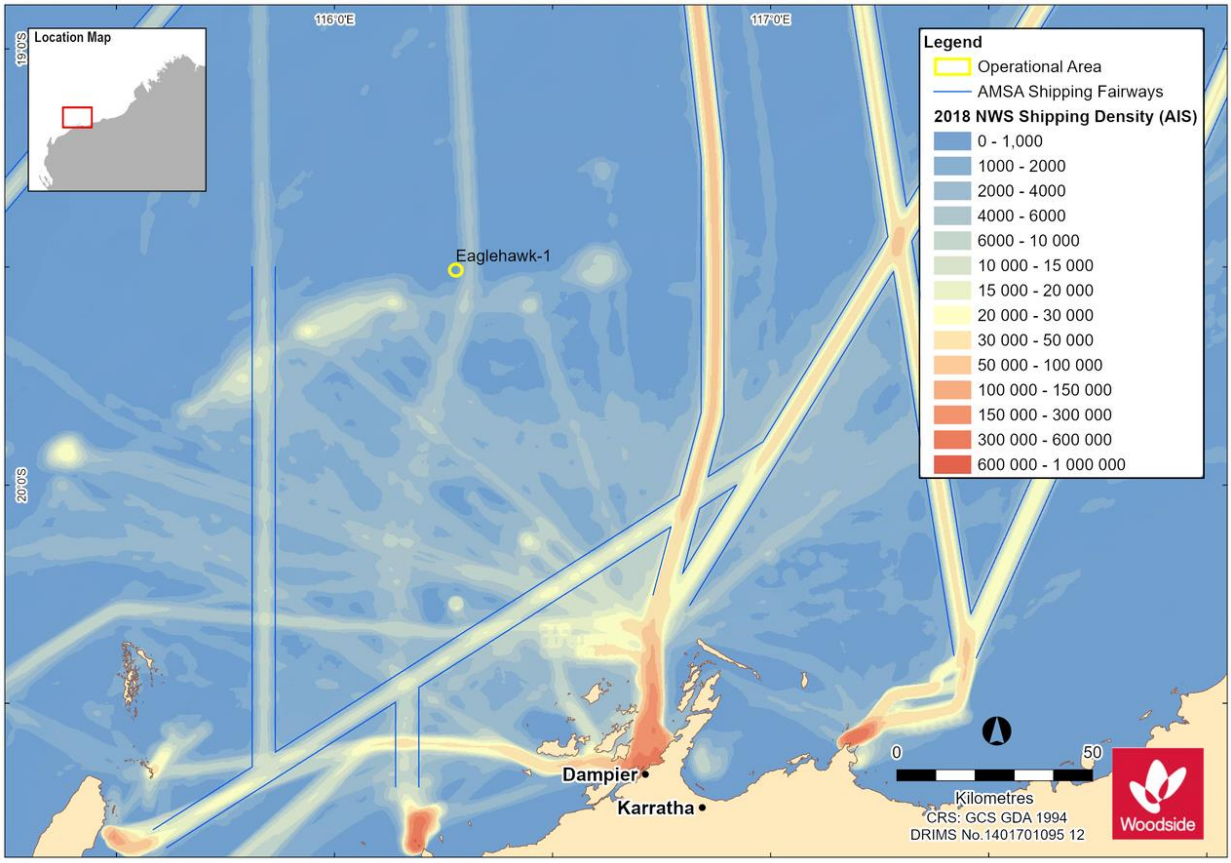


Figure 5-10: Vessel density map for the Operational Area and EMBA, derived from AMSA satellite tracking system data (vessels include cargo, LNG tanker, passenger vessels, support vessels, and others/unnamed vessels)

5.9.6 Oil and Gas

Table 5-19 details other oil and gas facilities located within 50 km of the Operational Area. Appendix H: Section 11.9 of the accepted Enfield Plug and Abandonment EP describes current oil and gas development within the EMBA, also shown in **Figure 5-11**.

Table 5-19: Other Oil and Gas Facilities located within 50 km of the Operational Area

Facility Name and Operator	Distance and Direction from Operational Area to Listed Place (km)
North Rankin Complex (Woodside)	12 km to the southwest
Okha FPSO (Woodside)	21 km to the east
Angel Platform (Woodside)	39 km to the east
Goodwyn A Platform (Woodside)	46 km to the southwest

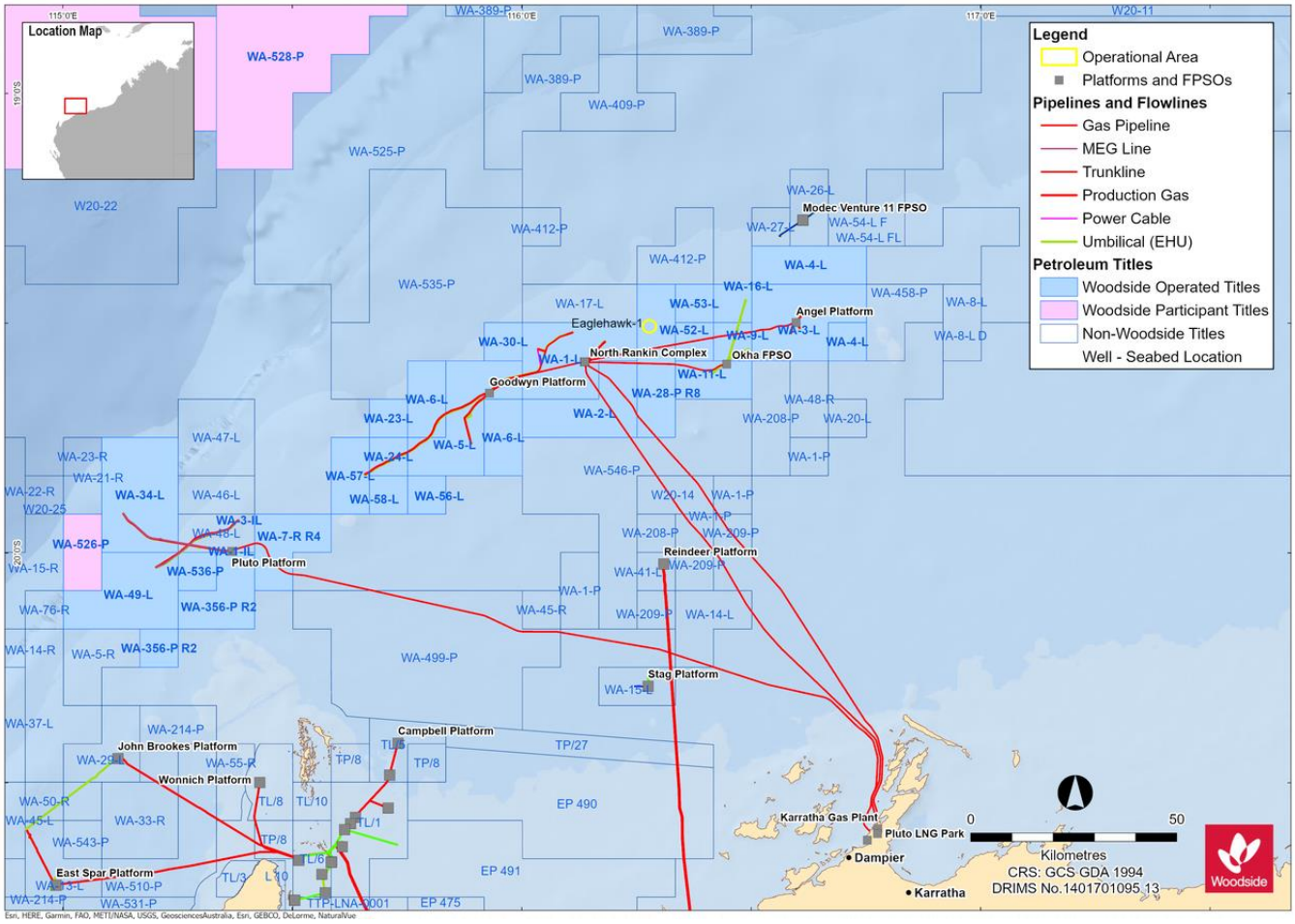


Figure 5-11: Oil and gas infrastructure within the Operational Area and EMBA

5.9.7 Defence

The Australian Border Force vessels undertake civil and maritime surveillance within the Northwest and Northern coastal zones, with the primary purpose of monitoring the passage of illegal entry vessel and illegal fishing activity within these areas.

No defence areas or infrastructure intersects the Operational Area. The closest defence training area is approximately 149 km to the south west of the Operational Area. This defence training area and a defence practise area (approximately 307 km south east of Operational Area) intersect the EMBA.

6. STAKEHOLDER CONSULTATION

6.1 Summary

Woodside is committed to consulting relevant stakeholders to ensure stakeholder feedback informs its decision making and planning for proposed petroleum activities and builds upon Woodside's extensive and ongoing stakeholder consultation for its offshore petroleum activities in the region.

6.2 Stakeholder Consultation Guidance

Woodside has followed the requirements of subregulation 11A (1) of the Environment Regulations to identify relevant stakeholders, these being:

- Each Department or agency of the Commonwealth Government to which the activities to be carried out under the Environment Plan, or the revision of the Plan, may be relevant.
- Each Department or agency of a State or the Northern Territory Government to which the activities to be carried out under the Environment Plan, or the revision of the Plan, 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 Environment Plan, or the revision of the Plan.
- Any other person or organisation that the Titleholder considers relevant.

Woodside's assessment of stakeholder relevance is outlined in **Table 6-1**.

6.3 Stakeholder Consultation Objectives

In support of this EP, Woodside has sought to:

- Ensure all relevant stakeholders are identified and engaged in a timely and effective manner.
- Develop and make available communications material to stakeholders that is relevant to their interests and information needs.
- Incorporate stakeholder feedback into the management of the proposed activity where practicable.
- Provide feedback to stakeholders on Woodside's assessment of their feedback and keep a record of all engagements.
- Make available opportunities to provide feedback during the life of this EP.

6.4 Stakeholder Expectations for Consultation

Stakeholder consultation for this activity has also been guided by stakeholder organisation expectations for consultation on planned activities. This guidance includes:

NOPSEMA:

- *GL1721 - Environment plan decision making – June 2021*
- *GN1847 - Responding to public comment on environment plans - September 2020*
- *GN1344 - Environment plan content requirements - September 2020*
- *GN1488 - Oil pollution risk management - February 2021*
- *GN1785 – Petroleum activities and Australian Marine Parks – June 2020*

- *GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – July 2020*
- *NOPSEMA Bulletin #2 – Clarifying statutory requirements and good practice consultation – November 2019*

Australian Fisheries Management Authority:

- *Petroleum industry consultation with the commercial fishing industry*

Commonwealth Department of Agriculture and Water Resources:

- *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*

Woodside acknowledges that additional relevant stakeholders may be identified, or identify themselves, prior to or during the proposed activity. These stakeholders will be contacted, provided with information relevant to their interests, and invited to provide feedback about the proposed activity. Woodside will assess their feedback, respond to the stakeholder, and incorporate feedback into the management of the proposed activity where practicable.

Woodside consultation arrangements typically provide stakeholders up to 30 days (unless otherwise agreed) to review and respond to proposed activities where stakeholders are potentially affected. Woodside considers this consultation period an adequate timeframe in which stakeholders can assess potential impacts of the proposed activity and provide feedback.

Table 6-1:Assessment of Relevant Stakeholders for the Proposed Activity

Stakeholder	Relevant to activity	Reasoning
Commonwealth Government department or agency		
Australian Border Force (ABF)	Yes	Responsible for coordinating maritime security.
Australian Fisheries Management Authority (AFMA)	No	Responsible for managing Commonwealth fisheries. No Commonwealth fisheries active in the Operational Area. Woodside has provided information to AFMA, consistent with information provided to other stakeholders with an interest in Commonwealth fisheries.
Australian Hydrographic Office (AHO)	Yes	Responsible for maritime safety and Notices to Mariners.
Australian Maritime Safety Authority (AMSA) – Marine Safety	Yes	Statutory agency for vessel safety and navigation and legislated responsibility for oil pollution response in Commonwealth waters. Proposed activity has a hydrocarbon spill risk, which may require AMSA assistance for pollution response.
Australian Maritime Safety Authority (AMSA) – Marine Pollution	Yes	Legislated responsibility for oil pollution response in Commonwealth waters. Proposed activity has a hydrocarbon spill risk, which may require AMSA response in Commonwealth waters.
Department of Agriculture, Water and the Environment (DAWE) – Fisheries	Yes	Responsible for implementing Commonwealth policies and programs to support agriculture, water resources, the environment and our heritage. No Commonwealth fisheries are active in the Operational Area. Woodside has provided information to DAWE, consistent with information provided to other stakeholders with an interest in Commonwealth fisheries.
DAWE – Biosecurity (marine pests, vessels, aircraft and personnel)	Yes	DAWE administers, implements and enforces the Biosecurity Act 2015. The Department requests to be consulted where an activity has the potential to transfer marine pests. DAWE 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. The proposed activity has the potential impact to DAWE's interests in the prevention of introduced marine species.
Department of Defence (DoD)	No	Responsible for defending Australia and its national interests. The Operational Area is not within a defence area.

Stakeholder	Relevant to activity	Reasoning
Department of Industry, Science, Energy and Resources (DISER)	Yes	Department of relevant Commonwealth Minister and is required to be consulted under the Regulations.
Director of National Parks (DNP)	Yes	Responsible for managing AMPs and therefore 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).
WA Government department or agency		
Department of Biodiversity, Conservation and Attractions (DBCA)	No	Responsible for managing WA's parks, forests and reserves. Planned activities do not impact DBCA's functions, interests or activities.
Department of Mines, Industry Regulation and Safety (DMIRS)	Yes	Department of relevant State Minister and is required to be consulted under the Regulations.
Department of Primary Industries and Regional Development (DPIRD)	Yes	Responsible for managing State fisheries. Potential for interaction during proposed activities with the Pilbara Line Fishery and Pilbara Trap Fishery in the Operational Area. Woodside has also chosen to consult Pilbara Trawl Fishers should there be future fishing in the area.
Department of Transport (DoT)	Yes	Legislated responsibility for oil pollution response in State waters. Proposed activity has a hydrocarbon spill risk, which may require DoT response in State waters.
Commonwealth fisheries*		
Southern Bluefin Tuna Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. Fishing will not occur in the Operational Area. 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). Woodside has provided information 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 or directly with fishers.
Western Tuna and Billfish Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years.

Stakeholder	Relevant to activity	Reasoning
		Woodside has provided information 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 or directly with fishers.
Western Skipjack Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. Woodside has provided information 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 or directly with fishers.
State fisheries*		
Mackerel Managed Fishery – Pilbara (Area 2)	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. Fishers are not active at water depths greater than 70 m (previous WAFIC advice).
South West Coast Salmon Managed Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. Fishers are active south of Perth and from the beach (previous WAFIC advice).
West Coast Deep Sea Crustacean Managed Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. In recent years fishing has only been undertaken along the continental shelf edge and in waters south of Exmouth (West Coast Deep Sea Crustacean Managed Fishery; DPIRD, 2005).
Pilbara Crab Managed Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years, and target species (blue swimmer crab) are only found in waters up to 50 m deep.
Marine Aquarium Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. This is a dive and wade fishery with activities generally restricted to waters less than 30 m deep (previous WAFIC advice).
Specimen Shell Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. This is a dive and wade fishery with activities generally restricted to waters less than 30 m deep (previous WAFIC advice).
Abalone Managed Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years.

Stakeholder	Relevant to activity	Reasoning
		This is a dive and wade fishery with activities generally restricted to waters less than 30 m deep (previous WAFIC advice).
Onslow Prawn	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years.
North Coast Shark	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area since 2008/09 (DPIRD).
Pearl Oyster Fishery	No	Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. This is a dive and wade fishery with water depths not conducive for this fishery.
Pilbara Demersal Scalefish Fishery • Pilbara Trawl Fishery • Pilbara Trap Fishery • Pilbara Line Fishery	Yes	The Operational Area overlaps Area 6 (closed to trawling) of the fishery. Although the area is currently closed to trawling, Woodside provided consultation information to the fishery based on the unlikely event that the well infrastructure requires an external cut to be removed and that this results in a portion of the well infrastructure being left above the mudline.
	Yes	The fishery overlaps the Operational Area and DPIRD data indicate active fishing within the Operational Area.
	Yes	The fishery overlaps the Operational Area and DPIRD data indicate active fishing within the Operational Area.
Industry		
Mobil Australia	Yes	Adjacent Titleholder.
Santos	Yes	Adjacent Titleholder.
Sapura OMV Upstream	Yes	Adjacent Titleholder.
Finder No 9	Yes	Adjacent Titleholder.
Fugro Exploration	Yes	Adjacent Titleholder.
Industry representative organisations		
Australian Petroleum Production and Exploration Association (APPEA)	Yes	Represents the interests of oil and gas explorers and producers in Australia.
Commonwealth Fisheries Association (CFA)	No	Represents the interests of commercial fishers with licences in Commonwealth waters. No Commonwealth fisheries active in the Operational Area.

Stakeholder	Relevant to activity	Reasoning
		Woodside has provided information to the CFA 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.
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	No	Although the Southern Bluefin Tuna fishery overlaps the Operational Area, it has not been active in the Operational Area within the last five years. Fishing will not occur in the Operational Area. 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). Woodside has provided information to the ASBTIA on AFMA advice that it expects all Commonwealth fishers who have entitlements to fish within the proposed area to be consulted, which can be through the relevant fishing industry associations.
Pearl Producers Association (PPA)	No	Although interactions with licence holders in the Pearl Oyster Managed Fishery are unlikely, PPA has requested to be informed of Woodside's planned activities.
Recfishwest	No	Represents the interests of recreational fishers in WA. Activities do not have the potential to impact recreational fishers.
Marine Tourism WA	No	Represents the interests of recreational fishers in WA. Activities do not have the potential to impact recreational fishers.
WA Game Fishing Association	No	Represents the interests of charter owners and operators in WA. Activities do not have the potential to impact game fishers.
Western Australian Fishing Industry Council (WAFIC)	Yes	Represents the interests of commercial fishers with licences in State Waters. DPIRD data indicates active fishing in the area by the Pilbara Trap fishery and Pilbara Line fishery.
Other Stakeholders		
Karratha based charter boat, tourism and dive operators	No	There has been no effort in the Operational Area by charter boat operators.
Karratha Community Liaison Group	Yes	Group established in 2002 to provide a forum for local community, industry and government stakeholders and the oil and gas industry to discuss operations and community issues.
Karratha and District Chamber of Commerce and Industry (KDCCI)	Yes	Not-for-profit group that represents local businesses.
City of Karratha	Yes	Local government entity for the Karratha region. Broader interest in activities in the region.

Stakeholder	Relevant to activity	Reasoning
Murujuga Aboriginal Corporation	No	Approved Body Corporate for the Burrup and Maitland Industrial Estates Agreement (BMIEA). Woodside has chosen to provide information to the Corporation as an interested stakeholder.
Ngarluma Aboriginal Corporation	No	Native Title determination area is outside of the location. Woodside has chosen to provide information to the Corporation as an interested stakeholder.
Wirrawandi Aboriginal Corporation	No	Native Title determination area is outside of the location. Woodside has chosen to provide information to the Corporation as an interested stakeholder.
Wong-Goo-Tt-Oo	No	No Native Title determination area. Woodside has chosen to provide information to the Corporation as an interested stakeholder.

** Fisheries have been identified as being relevant on the basis of fishing licence overlap with the proposed Operational Area, as well as consideration of fishing effort data, fishing methods, water depth, and likelihood of fishing in the future.* ***Table 5-18*** *provides a detailed assessment of Commonwealth and State fisheries within or adjacent to the Operational Area.*

6.5 Stakeholder Consultation

Consultation activities conducted for the proposed activity with relevant stakeholders are outlined in **Table 6-2**.

Consultation activities with additional self-identified stakeholders are outlined in **Table 6-3**.

The Consultation Information Sheet (**Appendix F**, reference 1.19) is published on the Woodside website and includes a toll-free 1800 phone number.

Table 6-2: Stakeholder Consultation Activities

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
Australian Government department or agency				
ABF	On 30 August 2021, Woodside emailed ABF advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has addressed maritime security-related issues in **Section 7.6.1** of this EP based on previous offshore activities. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
AFMA	On 30 August 2021, Woodside emailed AFMA advising of the proposed activity (Appendix F, reference 1.3) and provided a Consultation Information Sheet, and fisheries map.	On 1 September 2021, the AFMA responded acknowledging Woodside's intention to submit a Decommissioning Environment Plan for Calthorpe-1. AFMA advised that: • Due to limited resources AFMA is unable to comment on individual proposals. • It is important to consult with all fishers who have entitlements to fish within the proposed area.	On 3 September 2021, Woodside responded thanking the AFMA for its feedback and confirmed that Woodside has consulted all Commonwealth fisheries who have entitlements to fish within the proposed area.	Woodside has responded to AFMA's feedback. Woodside has consulted relevant Commonwealth fishery stakeholders including DAWE, CFA, ASBTIA, WAFIC, and individual Licence holders. Woodside has assessed the relevancy of State fisheries issues in **Section 5.9.2** of this EP. From this, no interactions with commercial fisheries are expected; however, Woodside will notify AFMA prior to the start date of the activity (PS 1.3).

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
				Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
AHO	On 30 August 2021, Woodside emailed the AHO advising of the proposed activity (Appendix F, reference 1.4) and provided a Consultation Information Sheet, and shipping lanes map.	On 31 August 2021, the AHO responded acknowledging receipt of Woodside's email.	Woodside notes the AHO has received the consultation materials.	Woodside will notify the AHO no less than four working weeks before operations commence (PS 1.1). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
AMSA (Marine Safety)	On 30 August 2021, Woodside emailed AMSA advising of the proposed activity (Appendix F, reference 1.4) and provided a Consultation Information Sheet, and shipping lanes map.	On 2 September 2021, AMSA emailed Woodside requesting: • The AHO be contacted no less than four working weeks before operations commence for the promulgation of related notices to mariners. • AMSA's Joint Rescue Coordination Centre (JRCC) be notified at least 24–48 hours before operations commence • Provide updates to the AHO and JRCC should there be changes to the activity. • Vessels exhibit appropriate lights and shapes to reflect the nature of operations and comply with the International Rules of Preventing Collisions at Sea. AMSA provided advice on obtaining vessel traffic plots, including digital datasets and maps.	On 3 September 2021, Woodside responded confirming 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 • Provide updates to both the AHO and AMSA on any changes. Confirming 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.	Woodside has addressed AMSA's requests: • Woodside will notify AMSA's JRCC at least 24–48 hours before operations commence (PS 1.2). • Woodside will notify the AHO no less than four working weeks before operations commence (PS 1.1). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
AMSA (Marine Pollution)	On 2 September 2021, Woodside emailed AMSA and provided a copy of the Oil Pollution First Strike Plan (**Appendix H**).	No feedback received.	No response required. Woodside provided the Oil Pollution First Strike Plan to AMSA.	Woodside has provided the Oil Pollution First Strike Plan to AMSA (**Appendix H**) and addressed oil pollution planning and response at **Appendix D**. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
DAWE	On 30 August 2021, Woodside emailed DAWE advising of the proposed activity (Appendix F, reference 1.6) and provided a Consultation Information Sheet, and relevant fisheries map.	No feedback received.	No response required.	No feedback provided. Woodside has consulted relevant Commonwealth fishery stakeholders including the AFMA, CFA, ASBTIA, WAFIC, and individual Licence holders. Woodside has assessed the relevancy of State fisheries issues in **Section 5.9.2**of this EP. From this, no interactions with Commonwealth commercial fisheries are expected. Woodside will notify DAWE prior to the start date of the activity (PS 1.3). Woodside has addressed maritime biosecurity issues in **Section 7.7.6** of this EP based on previous offshore activities. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
DISER	On 30 August 2021, Woodside emailed DISER advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
DNP	On 15 November 2021, Woodside emailed DNP advising of the proposed activity (Appendix F, reference 1.24) and provided a Consultation Information Sheet.	No feedback received.	Woodside notes DNP has received the consultation materials.	Woodside notes DNP has received the consultation materials, with feedback requested by 15 December 2021. Woodside will respond to any feedback received, if required.
Western Australian Government department or agency or advisory body				
DMIRS	On 30 August 2021, Woodside emailed DMIRS advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.	On 24 September 2021, DMIRS responded: acknowledging receipt consultation information advising that it had reviewed the information and did not require any further information at this stage requested that commencement and cessation notifications for the activity are sent to DMIRS noted its Consultation Guidance Note for reporting of incidents that could potentially impact on any land or water under State jurisdiction.	On 28 September 2021, Woodside responded: thanking DMIRS for its feedback confirming that DMIRS had reviewed the consultation information and did not require any further information at this stage. confirmed that Woodside would send DMIRS commencement and cessation notifications for the activities.	Woodside will provide notifications to DMIRS prior to the commencement and at the end of the activity (**Section 8.8.2.1**). Woodside considers this adequately addresses stakeholder interests and no further consultation is required
DPIRD	On 30 August 2021, Woodside emailed DPIRD advising of the proposed activity (Appendix F, reference 1.7) and provided a Consultation Information Sheet, and relevant fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant State fishery stakeholders including DPIRD, WAFIC, PPA and individual relevant Licence holders. Woodside has assessed the relevancy of State fisheries issues in **Section 5.9.2** of this EP. There is potential for interactions with fishing vessels from the Pilbara Trap Limited and Pilbara Line fishery to occur. Potential impacts to these fisheries are discussed in **Section 7.6.1** and were assessed as

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
				localised, temporary displacement with no lasting effect. Woodside will notify DPIRD prior to the start date of the activity (PS 1.3). Woodside considers this adequately addresses stakeholder interests and no further consultation is required
DoT	On 30 August 2021, Woodside emailed DoT advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.	On 10 September 2021, DoT responded noting that Woodside had provided DoT with the First Strike plan for the Eaglehawk-1 Exploration Wellhead Decommissioning activities which it would review and provide any comment.	No response required. Woodside provided the Oil Pollution First Strike Plan to DoT.	Woodside provided a draft Oil Pollution First Strike Plan to DoT and has addressed their comments in the final version (**Appendix H**). Woodside has addressed oil pollution planning and response in **Appendix D**. Woodside will consult DoT if there is a spill impacting State Waters from the proposed activity (**Appendix H**). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
	On 2 September 2021, Woodside emailed DoT and provided a copy of the Oil Pollution First Strike Plan (**Appendix H**).	On 30 September 2021, the DoT thanked Woodside for providing its Oil Pollution First Strike Plan and advised: • DoT has moved away from using volumes to define spill levels. • The requested use of DoT equipment from Karratha may be less relevant given response options. • DoT does not have any further comment.	On 30 September 2021, Woodside responded thanking DoT for is review and comments and advised that it would: • action DoT's comments prior to finalising the EP. • send DoT a final copy of the Oil Pollution First Strike Plan once accepted.	
Commonwealth Fisheries				
Southern Bluefin Tuna Fishery	On 30 August 2021, Woodside emailed the Southern Bluefin Tuna Fishery licence holders advising of the proposed activity (Appendix F, reference 1.9) and provided a	No feedback received.	No response required.	Woodside has consulted relevant Commonwealth fishery stakeholders including the AFMA, DAWE, CFA, ASBTIA, WAFIC, and individual relevant Licence holders.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
	Consultation Information Sheet, and relevant fisheries map.			Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 5.9.2** of this EP. No potential for interaction with this fishery was identified. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Western Tuna and Billfish Fishery	On 30 August 2021, Woodside emailed the Western Tuna Billfish Fishery licence holders advising of the proposed activity (Appendix F, reference 1.9) and provided a Consultation Information Sheet, and relevant fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant Commonwealth fishery stakeholders including the AFMA, DAWE, CFA, ASBTIA, WAFIC, and individual relevant Licence holders. Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 5.9.2** of this EP. No potential for interaction with this fishery was identified. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Western Skipjack Fishery	On 30 August 2021, Woodside emailed the Western Skipjack Fishery licence holders advising of the proposed activity (Appendix F, reference 1.9) and provided a Consultation Information Sheet, and relevant fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant Commonwealth fishery stakeholders including the AFMA, DAWE, CFA, ASBTIA, WAFIC, and individual relevant Licence holders. Woodside has assessed the relevancy of Commonwealth fisheries issues in **Section 5.9.2** of this EP. No potential for interaction with this fishery was identified. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
State Fisheries				

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
Pilbara Trawl Fishery	On 30 August 2021, Woodside emailed the Pilbara Trawl Fishery licence holders advising of the proposed activity (Appendix F, reference 1.10) and provided a Consultation Information Sheet, and relevant fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant State fishery stakeholders including DPIRD, WAFIC, PPA and individual relevant Licence holders. Woodside has assessed the relevancy of State fisheries issues in **Section 5.9.2** of this EP. No potential for interaction with this fishery was identified. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Pilbara Trap Fishery	On 30 August 2021, Woodside emailed the Pilbara Trap Fishery licence holders advising of the proposed activity (Appendix F, reference 1.10) and provided a Consultation Information Sheet, and relevant fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant State fishery stakeholders including DPIRD, WAFIC, PPA and individual relevant Licence holders. Woodside has assessed the relevancy of State fisheries issues in **Section 7.6.1** of this EP. Woodside will provide notifications to Pilbara Trap Fishery prior to the commencement and at the end of the activity (PS 1.3). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Pilbara Line Fishery	On 30 August 2021, Woodside emailed the Pilbara Line Fishery licence holders advising of the proposed activity (Appendix F, reference 1.10) and provided a Consultation Information Sheet, and relevant fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant State fishery stakeholders including DPIRD, WAFIC, PPA and individual relevant Licence holders. Woodside has assessed the relevancy of State fisheries issues in **Section 7.6.1** of this EP. Woodside will provide notifications to Pilbara Line Fishery prior to the

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
				commencement and at the end of the activity (PS 1.3). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Industry				
Mobil Australia	On 30 August 2021, Woodside emailed Mobil Australia advising of the proposed activity (Appendix F, reference 1.8) and provided a Consultation Information Sheet, and Titleholder map.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Santos	On 30 August 2021, Woodside emailed Santos advising of the proposed activity (Appendix F, reference 1.8) and provided a Consultation Information Sheet, and Titleholder map.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Sapura OMV Upstream	On 30 August 2021, Woodside emailed Sapura OMV Upstream advising of the proposed activity (Appendix F, reference 1.8) and provided a Consultation Information Sheet, and Titleholder map.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Finder No 9	On 30 August 2021, Woodside emailed Finder No 9 advising of the proposed activity (Appendix F, reference 1.8) and provided a Consultation Information Sheet, and Titleholder map.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Fugro Exploration	On 30 August 2021, Woodside emailed Fugro Exploration advising of the proposed activity (Appendix F, reference 1.8) and	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
	provided a Consultation Information Sheet, and Titleholder map.			Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Industry representative organisations				
APPEA	On 30 August 2021 Woodside emailed APPEA advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
CFA	On 30 August 2021, Woodside emailed the CFA advising of the proposed activity (Appendix F, reference 1.3) and provided a Consultation Information Sheet, and fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant Commonwealth fishery stakeholders including the AFMA, DAWE, CFA, ASBTIA, WAFIC, and individual relevant Licence holders. Woodside has assessed the relevance of Commonwealth fisheries issues in **Section 5.9.2** of this EP. From this, no interactions with Commonwealth commercial fisheries are expected. Woodside will notify CFA prior to the start date of the activity (PS 1.3). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
ASBTIA	On 30 August 2021, Woodside emailed the ASBTIA advising of the proposed activity (Appendix F, reference 1.3) and provided a Consultation Information Sheet, and fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant Commonwealth fishery stakeholders including the AFMA, DAWE, CFA, ASBTIA, WAFIC, and individual relevant Licence holders. Woodside has assessed the relevance of Commonwealth fisheries issues in **Section 5.9.2** of this EP. From this, no interactions with this fishery are expected. Woodside will notify ASBTIA prior to the start date of the activity (PS 1.3). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
PPA	On 30 August 2021, Woodside emailed the PPA advising of the proposed activity (Appendix F, reference 1.11) and provided a Consultation Information Sheet, and fisheries map.	No feedback received.	No response required.	Woodside has consulted relevant State fishery stakeholders including DPIRD, WAFIC, PPA and individual relevant Licence holders. Woodside has assessed the relevancy of State fisheries issues in **Section 5.9.2** of this EP. From this, no interactions with this fishery are expected. As requested (**Table 6-1**), Woodside will notify PPA prior to the start date of the activity (PS 1.3). Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
WAFIC	On 30 August 2021, Woodside emailed WAFIC advising of the proposed activity (Appendix F, reference 1.7) and provided a Consultation Information Sheet, and fisheries map.	On 6 October 2021, WAFIC responded advising that WAFIC supports the proposed removal of the wellhead. WAFIC requested confirmation that: • planned activities include removal of the wellhead, as well as temporary and permanent guide	On 7 October 2021, Woodside responded to WAFIC advising:	Woodside has consulted relevant State fishery stakeholders including DPIRD, WAFIC, PPA and individual relevant Licence holders.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
	On 28 September 2021, Woodside emailed WAFIC advising that consultation feedback for the Eaglehawk-1 Exploration Wellhead Decommissioning Environment Plan concludes on 29 September 2021 and that Woodside would welcome any feedback WAFIC may have.	• Any infrastructure associated with the Eaglehawk1 will remain in situ. • There is any snag risk; • Once the wellhead is removed, it will be removed from navigational charts and the exclusion zone removed.	bases. No infrastructure associated with the wellhead is planned to be left *in situ*. As such there is no snag risk once the infrastructure is removed. • In the unexpected event that the preferred cutting method is unsuccessful at removing the wellhead, a diamond wire saw will be used to achieve an external cut. This contingency option is not expected to be required as the preferred option is expected to have high feasibility. • Should the contingency method be required, the cut will be made as close to the mudline as possible. However, up to 1 m above the current mudline may be required to be left *in situ*. • The 1500 m radius Operational Area around the wellhead and temporary 500 m exclusion zone is intended to be removed following completion of activities and Woodside will advise the AHO to enable the wellhead to be removed from navigational charts. • Although no trawl vessels operate in the area, there is potential for this to change in the future. As such, should well infrastructure above the mudline not be able to be removed the AHO will be notified of the wellhead location. • The impact from one partial wellhead remaining *in situ* is considered negligible.	Woodside has assessed the relevancy of State fisheries issues in **Section 5.9.2** of this EP. Woodside will provide notifications to WAFIC and relevant Fishery Licence Holders (Pilbara Trap Fishery and Pilbara Line Fishery) prior to the commencement and at the end of the activity (PS 1.3). Woodside has addressed WAFIC's feedback, including advising that: • No infrastructure associated with the wellhead is planned to be left *in situ* and as such there is no snag risk once the infrastructure is removed. • The 1500 m radius Operational Area around the wellhead and temporary 500 m exclusion zone is intended to be removed following completion of activities and the wellhead removed from navigational charts. • In the unexpected event that the preferred cutting method is unsuccessful at removing the wellhead, the cut will be made as close to the mudline as possible. Should this occur, the AHO will be notified of the wellhead location. The impact from one partial wellhead remaining in situ is considered negligible.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
				Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Other stakeholders				
Karratha Community Liaison Group	On 30 August 2021, Woodside emailed the Karratha Community Liaison Group advising of the proposed activity (Appendix F, reference 1.12) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Karratha and District Chamber of Commerce and Industry (KDCCI)	On 30 August 2021, Woodside emailed the KDCCI advising of the proposed activity (Appendix F, reference 1.13) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
City of Karratha	On 30 August 2021, Woodside emailed the City of Karratha advising of the proposed activity (Appendix F, reference 1.14) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Murujuga Aboriginal Corporation	On 31 August 2021, Woodside had a meeting with the Murujuga Aboriginal Corporation CEO where the Corporation was advised of the proposed activity and that	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond.

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
	consultation materials would be received via email shortly. On 31 August 2021, Woodside emailed the Murujuga Aboriginal Corporation advising of the proposed activity (Appendix F, reference 1.17) and provided a Consultation Information Sheet.			Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Ngarluma Aboriginal Corporation	On 30 August 2021, Woodside emailed the Ngarluma Aboriginal Corporation advising of the proposed activity (Appendix F, reference 1.15) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Wirrawandi Aboriginal Corporation	On 30 August 2021, Woodside emailed the Ngarluma Aboriginal Corporation advising of the proposed activity (Appendix F, reference 1.16) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.
Wong-Goo-Tt-Oo	On 31 August 2021, Woodside emailed the Ngarluma Aboriginal Corporation advising of the proposed activity (Appendix F, reference 1.18) and provided a Consultation Information Sheet.	No feedback received.	No response required.	Woodside has provided sufficient information and opportunity to respond. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.

Table 6-2: Stakeholder Consultation Activities with Self-Identified Stakeholders

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
Australian Government department or agency				

Stakeholder	Information provided	Stakeholder response	Woodside response	Woodside assessment and outcome
Terry Romaro, OAM	On 30 August 2021, Woodside emailed relevant fishery licence holders advising of the proposed activity (Appendix F, reference 1.1) and provided a Consultation Information Sheet. Terry Romaro OAM received consultation information indirectly via fishing licence holder(s).	On 30 August 2021, Mr Romaro responded to Woodside advising that: • he is a member of fishery advisory committees. • members of these Committees would be concerned by a pollution event and the impacts on fisheries. • Compensation arrangements should be outlined in the event of a pollution event occurring.	On 10 September 2021, Woodside responded thanking Mr Romaro for his query and advising that: • The well has been permanently plugged for abandonment to eliminate the possibility of hydrocarbon release to the environment. • The most credible scenario for an unplanned hydrocarbon event during this wellhead removal activity is a vessel collision involving marine diesel. • Our modelling and risk assessment concluded that a loss of marine diesel resulting from a vessel collision is unlikely to cause significant direct impacts to target species of Commonwealth or State commercial fisheries. • Should it be identified that commercial fishers may be affected Woodside would, at the relevant time, engage with these parties.	Woodside has addressed Mr Romaro's feedback, including advising that: • Our modelling and risk assessment concluded that a loss of marine diesel resulting from a vessel collision is unlikely to cause significant direct impacts to target species of Commonwealth or State commercial fisheries. • Should it be identified that commercial fishers may be affected Woodside would, at the relevant time, engage with these parties. Woodside has addressed maritime security-related issues in **Section 7** of this EP based on previous offshore activities. Woodside considers this adequately addresses stakeholder interests and no further consultation is required.

6.6 Ongoing Stakeholder Consultation

Woodside is committed to the engagements listed in **Table 6-3**, based on stakeholder feedback.

Table 6-3: Ongoing stakeholder consultation

Stakeholder	Activity
AHO	Woodside will notify the AHO no less than 4 weeks before operations commence and provide updates to AHO on any changes to planned activities (PS 1.1).

AMSA	Woodside will notify AMSA's JRCC at least 24-48 hours before operations commence, the start and end of operations and provide updates to AMSA on any changes in timing to planned activities (PS 1.2).
DMIRS	Woodside will send DMIRS commencement and cessation notifications (**Section 8.8.2.1**).
DoT	Woodside will consult DoT if there is a spill impacting State waters from the proposed activity (**Appendix H**).
Relevant fishery stakeholders	Woodside will send relevant fisher stakeholders commencement and cessation of activity notifications, including AFMA, DAWE, DPIRD, WAFIC, PPA, CFA, ASBTIA and relevant Fishery Licence Holders (Pilbara Trap Fishery and Pilbara Line Fishery) (PS 1.3).

7. ENVIRONMENTAL IMPACT AND RISK ASSESSMENT, PERFORMANCE OUTCOMES, STANDARD AND MEASUREMENT CRITERIA

7.1 Overview

This section presents the impact and risk assessment, evaluation and EPOs, EPSs and MC for the Petroleum Activities Program, using the methodology described in **Section 2**.

7.2 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 Operational Area.

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

1. Planned activities (routine and non-routine) that have the potential for inherent environmental impacts.
2. 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 such as emissions and physical presence. In all cases, the worst credible consequence was assumed.

The ENVID (performed in accordance with the methodology described in **Section 2**) was conducted on 4 May 2021 and identified seven impacts and six risks associated with the Petroleum Activities Program. A summary of the ENVID is provided in **Table 7-1**.

The impact and risk analysis and evaluation for the Petroleum Activities Program indicate 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 7.6** and **7.7**.

7.2.1 Cumulative Impacts

The closest petroleum facilities are described in **Section 5.9.6**, with North Rankin Complex (Woodside) being 12 km to the SW from the Operational Area.

Woodside has assessed the potential for cumulative impacts of the Petroleum Activities Program in relation to other relevant petroleum activities that could realistically result in overlapping temporal and spatial extents. Given the short duration of the Petroleum Activities Program and the limited spatial extent of impacts arising from planned activities, the potential for cumulative impacts are not considered credible.

Table 7-1 Environmental Risk analysis and summary

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)						
Physical presence: interference with marine users	**7.6.1**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Physical presence: disturbance to benthic habitat	**7.6.2**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine acoustic emissions: vessels, helicopters and mechanical equipment operation	**7.6.3**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine atmospheric emissions: fuel combustion	**7.6.4**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine discharge: bilge water, grey water, sewage, putrescible wastes and deck drainage water	**7.6.5**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine discharges: Wellhead removal and recovery	**7.6.6**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Routine light emissions: external lighting on project vessels	**0**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Unplanned Activities (Accidents, Incidents, Emergency Situations)						
Accidental hydrocarbon release: vessel collision	**7.7.2**	D	Environment – Minor, short-term impact (one to two years) on species, habitat (but not affecting ecosystems function), physical or biological attributes	1	M	Acceptable
Unplanned discharge: deck spills	**7.7.3**	E	Environment – Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes	2	L	Broadly acceptable
Unplanned discharge: loss of solid hazardous and non-hazardous wastes (including dropped objects)	**7.7.4**	F	Environment – Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes	2	L	Broadly acceptable
Physical presence: vessel collision with marine fauna	**7.7.5**	F	Environment – No lasting effect (less than one month). Localised impact not significant to environmental receptors.	1	L	Broadly acceptable
Physical presence: introduction and establishment of invasive marine species	**7.7.6**	E	Environment – Slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes	0	L	Broadly acceptable

7.3 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 of the activity to ALARP and acceptable levels.

EPOs, EPSs and MC for the Petroleum Activities Program have been identified to allow the measurement of Woodside's environmental performance and the implementation of this EP to determine whether the EPOs and standards 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 Codes and Standards, Good Industry Practices and Professional Judgement outlined in **Section 2.6.2** as part of the acceptability and ALARP justification process.

The EPOs, EPSs and MC are presented throughout this section and in **Appendix D** (Oil Spill Preparedness and Response). A breach of these EPOs or standards constitutes a 'Recordable Incident' under the Environment Regulations (refer to **Section 8.8.4.2**).

7.4 Presentation

The environmental impact and risk analysis and evaluation (ALARP and acceptability), EPOs, EPSs 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.

Context **Description of the context for the impact/risk. Regulation 13(1), 13(2) and 13(3)>**														
Description of the Activity – Regulation 13(1)	*Description of the Environment – Regulation 13(2)(3)*							*Consultation – Regulation 11A*						
Impacts/Risks Evaluation Summary – *Summary of ENVID outcomes*														
	Environmental Value Potentially Impacted *Regulations 13(2)(3)*							***Evaluation*** ***Section 2.8*** *and* ***Section 2.9***						
Source of Impact/Risk *Regulation 13(1)*	***Soil and Groundwater***	***Marine Sediment***	***Water Quality***	***Air Quality (incl. Odour)***	***Ecosystems / Habitat***	***Species***	***Socio-economic***	***Decision Type***	***Impact/Consequence***	***Likelihood***	***Current Risk Rating***	***ALARP tools***	***Acceptability***	***Outcome***
Summary of source of risk/ impact														
Description of Source of Impact / Risk														
Description of the identified impact / risk including sources or threats that may lead to the risk or identified event. Regulation 13(1)														
Impact / Risk Assessment														
Discussion and assessment of the potential impacts / risks to the identified environment values(s). Regulation 13(5)(6). Potential impacts / risks to environmental values have been assigned and discussed based on Woodside's Environmental Consequence Definitions for Use in Environmental Risk Assessments (**Table 2-3**).														

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/Sacrifice (CS)[1]**	**Benefit in Impact / Risk Reduction[2]**	**Proportionality**	**Control Adopted**
ALARP Tool Used – Section 2.8.1 and Section 2.9				
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 or risk that could be averted or environmental benefit gained if the cost / sacrifice is made and the control is adopted.*	*Proportionality of cost/sacrifice versus 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 # provided.*
ALARP Statement: *Made based on the environmental risk assessment outcomes, use of the relevant tools appropriate to the decision type (**Section 2.8)** and a proportionality assessment. Regulation 10A(b).*				

Demonstration of Acceptability
Acceptability Statement: *Made based on applying the process described in **Section 2.8.2**, taking into account internal and external expectations, risk to environmental thresholds and use of environment decision principles. Regulation 10A(c).*

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	**Controls**	**Standards**	**Measurement Criteria**
EPO# *S: Specific performance which addresses the legislative and other controls that manage the activity and against which performance by Woodside in protecting the environment is measured.* *M: Performance against the outcome is measured by measuring 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 is relevant to the source of risk and the potentially impacted environmental value.* *T: The outcome states the timeframe during which the outcome will apply or by which it will be achieved.*	**C#** *Identified control adopted to ensure the impacts and risks are continuously reduced to ALARP.* *Regulation 13(5)(c)*	**PS#** *Statement of the performance required of a control measure.* *Regulation 13(7)(a)*	**MC#** *Measurement criteria for determining whether the outcomes and standards have been met.* *Regulation 13(7) (c)*

[1] Qualitative measure.
[2] Measured in terms of reduction of likelihood, consequence and current risk rating.

7.5 Environmental Risks/Impacts Deemed Not Credible

The ENVID identified sources of environmental risk and impact that were assessed as not being applicable (not credible) within the EMBA and, therefore, were determined to not form part of this EP (refer to **Section 2.5**). These are described in the next subsections for information only.

7.5.1 Loss of Well Integrity

There is no credible hydrocarbon release risk from the reservoir as the well has been permanently plugged with permanent downhole barriers in place (**Section 4**).

7.6 Planned Activities (Routine and Non-routine)

7.6.1 Physical Presence: Interactions with Marine Users

Context		
Project Vessels - **Section 4.7**	Socio-Economic Environment – **Section 5.9**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Interactions with other marine users – proximity of project vessels interfering with or displacing third party vessels							X	A	F	-	-	GP	Broadly Acceptable	EPO 1 EPO 2
Contingency continued presence of partial well infrastructure if removal at the mudline cannot be achieved.							X	A	F	-	-			

Description of Source of Impact

Presence of vessels and subsea infrastructure

The Petroleum Activities Program will be conducted using an offshore support vessel; a general support vessel may be used to transport equipment and materials between the Operational Area and port or to perform standby duties within the Operational Area. The presence of these vessels presents an opportunity for interaction with third-party marine users.

A temporary 500 m radius exclusion zone will be maintained around the offshore support vessels during operations (duration of up to 10 days). Marine users are requested to avoid this area during the activity to ensure the safety of the project vessel(s) and third-party vessels.

Continued presence of well infrastructure where not feasible to be removed at or below the mudline

Should the preferred cutting method (AWJ internal cutting) be unsuccessful at removing the well infrastructure, a diamond wire saw may be used to achieve an external cut (**Table 4-7**). This contingency option is not expected to be required based on well specifications, status/condition (e.g. nothing within the wells inhibiting an internal cut) and water depth. Therefore, the preferred option for an internal cut is expected to have high feasibility.

Should this method be found not appropriate or issues are experienced during removal that result in a diamond wire saw being required to cut the infrastructure, the cut will be made as close to the mudline as possible. However, up to 1 m above the current mudline may be required to be left in-situ due to the practicability of fitting the large equipment around the infrastructure to achieve the external cut. Other factors which may contribute to this are excess cementing around the well or natural hard substrate which make it not possible to clear a suitable area to position the saw for a cut at the mudline.

Impact Assessment

Potential Impacts to Environmental Values

Commercial Fishing

Although there are a number of Commonwealth and State managed commercial fisheries that overlap the Operational Area, only two have reported recent fishing effort in the vicinity of the Operational Area; the Pilbara Trap Fishery and the Pilbara Line Fishery. This is based on overlap with the 60 nm grid FishCube data available from DPIRD and

indicates possible fishing within the Operational Area (DPIRD, 2019). For the Pilbara Trap Fishery, FishCube data indicates up to five vessels were active in 2017, and less than three vessels in 2018 and 2019, and for the Pilbara Line Fishery, three or fewer vessels were active between 2016 and 2019.

The area of the 60 nm FishCube grid showing possible historical fishing effort over the Operational Area is equal to ~222 km^2. Based on the 500 m exclusion zone radius, fishers may be displaced from a 0.79 km^2 area during the activities. Considering the number of active vessels within the FishCube grid, the frequency and number of vessels of these fisheries occurring within the Operational Area is expected to be low.

In the unlikely event active commercial fishing vessels are present during the Petroleum Activities Program, temporary displacement would be localised and relate to the 500 m exclusion zone around the offshore support vessel for the duration of the Petroleum Activities Program (10 days). No lasting effect on commercial fishing activities is anticipated.

If the wellhead requires an external cut to be removed, a portion (up to 1 m above the current mudline) of the infrastructure may be left in-situ permanently. Although no trawling vessels currently operate in the area there is a potential for this to change in the future in which case the infrastructure may present a snag hazard to these trawl fishers. Given the low likelihood of this occurring and the small area this infrastructure occupies in comparison to the areas available for fishing, as well as that seabeds naturally comprise hazards that must be avoided by all marine users, the impact from this will be negligible.

Recreational Fishing and Tourism Operations

Recreational fishers are not expected to access the waters of the Operational Area, due to the distance from shore (127 km north-west from Dampier) and water depths (120 m). In the very unlikely event that recreational fishing effort occurs within the Operational Area during the Petroleum Activities Program, displacement as a result would relate only to the 500 m exclusion zone around the offshore support vessels for the duration of the Petroleum Activities Program (10 days).

Commercial Shipping

No shipping fairways overlap the Operational Area, the nearest being 43 km west of Operational Area. In the unlikely event active commercial shipping vessels are present during the Petroleum Activities Program, temporary displacement would be localised and relate to the 500 m exclusion zone around the offshore support vessels for the duration of the Petroleum Activities Program (10 days). No lasting effect on commercial shipping activities is anticipated.

Defence activities

No defence activities are expected to occur within the Operational Area.

Oil and Gas Activities

No oil and gas production wells or facilities are located within the Operational Area.

Summary of Potential Impacts to Environmental Values(s)

Given the adopted controls, it is considered that the physical presence of the project vessels will not result in a potential impact greater than localised, temporary displacement of other marine users, such as shipping and commercial fisheries, with no lasting effect.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[3]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Sea Dumping Permit for leaving partial wellhead in-situ if internal cut and external cut at the mudline cannot be achieved.	Determined a permit under the Environment Protection (Sea Dumping) Act 1981 is not required, given the infrastructure is considered to fall under the scope of article 1.4.2.3 of the London Protocol, which states that sea dumping does not include the 'abandonment in the sea of matter (such as cables, pipelines and marine research devices) placed for a purpose other than the mere disposal thereof'.			No
Good Practice				
Notify AHO of activities and movements no less than four weeks before the scheduled activity commencement date.	F: Yes CS: Minimal cost. Standard practice.	Notification to AHO will enable them to generate navigation warnings (Maritime Safety Information Notifications (MSIN)) and NTM [including AUSCOAST	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.1**

[1] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[3]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
		warnings where relevant)]).		
Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities and movements 24-48 hours before the scheduled activity commencement date.	F: Yes CS: Minimal cost. Standard practice.	Communication of the Petroleum Activities Program to other marine users ensures they are informed and aware, thereby reducing the likelihood of interference with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.2**
Notify relevant stakeholders of activities prior to the scheduled activity commencement date.	F: Yes CS: Minimal cost. Standard practice.	Communication of the Petroleum Activities Program to other marine users ensures they are informed and aware, thereby reducing the likelihood of interference with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.3**
Undertake consultation with relevant stakeholders for activities and movements that commence more than a year after EP acceptance.	F: Yes CS: Minimal cost. Standard practice.	Communication of the Petroleum Activities Program to other marine users ensures they are informed and aware, thereby reducing the likelihood of interference with other marine users.	Benefits outweigh cost/sacrifice. Control is also Standard Practice	Yes **C 1.4**
Project vessels to operate AIS.	F: Yes CS: Minimal cost. Standard practice.	Use of AIS on project vessels, and lights and virtual AIS on tail buoys will reduce the likelihood of an interaction with a third party vessel.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 2.1**
Where well infrastructure above the mudline cannot be removed and remaining portion may present a credible snag risk to future trawl fishers, notify AHO of wellhead location so it can continue to be marked on navigational charts.	F: Yes. CS: Minimal cost. Standard practice	Communication to AHO provides an opportunity for the exact location of the infrastructure to continue to be marked on navigational charts, giving potential future trawl fishers sufficient information to plan activities around the infrastructure.	Benefits outweigh cost/sacrifice.	Yes **C 2.2**
Professional Judgement – Eliminate				
Remove well infrastructure above the mudline, where feasible.	F: Yes. CS: Moderate cost.	Removal of infrastructure eliminates any potential interactions with commercial fishers.	Benefits outweigh cost/sacrifice.	Yes **C 2.2**
Limit activities to avoid peak shipping and commercial fishing activities.	F: No. Shipping occurs year-round. The potential for displacement of shipping from the Operational Area may occur given the moderate shipping density adjacent to the Operational Area.	Not considered – control not feasible.	Not considered – control not feasible.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[3]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
	The potential for displacement of commercial fishing activities is very unlikely as there is no recent fishing effort recorded within the Operational Area (refer to **Section 5.9.2**). In the very unlikely event commercial fishing activities are present, simultaneous operations (SIMOPS) with fishing seasons cannot be eliminated as fishing activities may occur throughout the year, and exact details on future fishing activities are not known. CS: Not considered – control not feasible.			
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				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
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 impacts and risks of the physical presence of the project vessels on other marine users, such as shipping and commercial fisheries. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement The impact assessment has determined that, given the adopted controls, physical presence of the project vessels (is unlikely to result in potential impact greater than localised and short-term concern to other marine users, such as shipping and commercial fisheries. Should an external cut using a diamond wire saw be required and cutting results in a portion of the well remaining above the mudline with a potential to act as a credible snag risk to future trawl fishers the impact is expected to be negligible and continuing to mark these wells on navigation charts will further minimise any impact. 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 expectations of AMSA and AHO provided during consultation with stakeholders. 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 the physical presence of the project vessels to a level that is broadly acceptable.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcome	***Controls***	***Standards***	***Measurement Criteria***
EPO 1 Marine users are aware of the Petroleum Activities Program.	**C 1.1** Notify AHO of activities and movements no less than four weeks before the scheduled activity commencement date.	**PS 1.1** Notification to AHO four weeks prior to scheduled commencement to allow for the generation of navigation warnings (MSIN and NTM [including AUSCOAST warnings where relevant])	**MC 1.1.1** Consultation records demonstrate that AHO has been notified prior to commencement of the Petroleum Activities Program within the required timeframes.
	C 1.2 Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities and movements 24-48 hours before the scheduled activity commencement date.	**PS 1.2** Notification to AMSA JRCC 24-48 hours prior to the scheduled commencement date.	**MC 1.2.1** Consultation records demonstrate that AMSA JRCC has been notified prior to commencement of the Petroleum Activities Program within the required timeframes.
	C 1.3 Notify stakeholders of activities prior to the scheduled activity commencement date.	**PS 1.3** Notification to AFMA, DAWE, DPIRD, WAFIC, PPA, ASBTIA, Pilbara Line Fishery, Pilbara Trap Fishery and CFA prior to commencement and upon completion of activities.	**MC 1.3.1** Consultation records demonstrate that AFMA, DAWE, DPIRD, WAFIC, PPA, ASBTIA, Pilbara Line Fishery, Pilbara Trap Fishery and CFA have been notified prior to commencement of decommissioning wellhead activities.
	C 1.4 Undertake consultation with relevant stakeholders for activities and movements that commence more than a year after EP acceptance	**PS 1.4** Notification to AFMA, DAWE, DPIRD, WAFIC, PPA, ASBTIA, Pilbara Line Fishery, Pilbara Trap Fishery and CFA prior to commencement of activities, if commencing more than one year after EP submission date	**MC 1.4.1** Consultation records demonstrate relevant stakeholders have been consulted with.
EPO 2 Prevent adverse interactions with other marine users during the Petroleum Activities Program or from continued presence of well infrastructure	**C 2.1** Project vessels to operate AIS.	**PS 2.1** Project vessels operating AIS.	**MC 2.1.1** Records demonstrate that project vessels operating AIS.
	C 2.2 Where well infrastructure above the mudline cannot be removed and remaining portion may present a credible snag risk to future trawl fishers, notify AHO of wellhead location so it can continue to be marked on navigational charts.	**PS 2.2** AHO notified of location of infrastructure remaining above the mudline, where it presents credible snag risk to future trawl fishers.	**MC 2.2.1** Records demonstrate that AHO has been notified of infrastructure remaining above the mudline, where it presents credible snag risk to future trawl fishers.
	C 2.3 Remove well infrastructure above the mudline, where feasible.	**PS 2.3** Well infrastructure above the mudline will be removed, where feasible.	**MC 2.3.1** Seabed clearance survey demonstrates well infrastructure above the

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcome	***Controls***	***Standards***	***Measurement Criteria***
			mudline has been removed, where feasible.

7.6.2 Physical Presence: Disturbance to Benthic Habitat

Context		
Activity Components - **Section 4**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Disturbance to seabed from subsea cleaning, sediment removal and other preparation for removal of well infrastructure activities					X			A	F	-	-	GP	Broadly Acceptable	NA
Disturbance to seabed from wellhead removal					X			A	F	-	-			
Disturbance to seabed from placement and recovery of transponders and clump weights/stands on seabed					X			A	F	-	-			
Contingency continued presence of partial well infrastructure if removal at the mudline cannot be achieved.					X			A	F	-	-			

Description of Source of Impact

Wellhead Removal

Localised seabed disturbance will occur when cutting and removing the well infrastructure. Given cut is planned to be made from within the well below the mudline, disturbance is expected to be minimal. AWJ cutting may result in localised sediment relocation and temporary increase in turbidity. Approximately 4 t of grit and 250 L flocculant per AWJ cut will be released, the majority below the mudline; however, a small proportion may accumulate on the seafloor. Removal of the TGB and PGB may require localised sediment relocation, as described below.

Subsea Cleaning and Sediment Relocation

Subsea cleaning and preparation activities include removing marine growth from the wellhead and relocating sediment that has built up to gain access for removal activities. This may be performed in a variety of ways. Those that have potential to impact the seabed include use of high-pressure water and/or brushes on ROVs.

Relocating sediment involves using an ROV-mounted suction pump/dredging unit to remove sediment that has built up around the subsea infrastructure. The sediment would be relocated nearby within the Operational Area and will result in localised disturbance where it has been removed from and at the site it is relocated to.

Set down of Wellheads

Wellheads may be set down on the seabed in the immediate vicinity of removal for a period to enable safe rigging prior to recovery. Placement of the wellhead on the seabed will result in temporary seabed disturbance and suspension of sediment causing increased turbidity.

ROV and transponders

The use of the ROV during Petroleum Program Activities may result in highly localised temporary seabed disturbance and suspension of sediment causing increased turbidity as a result of working close to, or occasionally on, the seabed. ROV used 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.

Transponders are deployed in an array on the seafloor using concrete clump weights or transponder stands. These are then retrieved by ROV at the end of the activity. Typical footprint for a transponder is less than 1 m^2.

Continued presence of well infrastructure where not feasible to be removed at or below the mudline

It is highly unlikely that some well infrastructure will not be able to be removed using the preferred method of internal cutting, and that the contingency method to externally cut results in up to 1 m of the infrastructure being required to be left in-situ above the current mudline (**Section 7.6.1**). The well infrastructure is made from mild steel. Over time, the infrastructure may self-bury and over the long-term will corrode. Due to the robustness of the materials of the wellhead and the deepwater location of the wellhead, corrosion is likely to be a relatively slow process about 0.2 mm/year (Melchers, 2005).

Impact Assessment
Potential Impacts to Environmental Values
The Operational Area is expected to consist primarily of sandy substrate and soft sediments (see **Section 5.4**) and broad-scale bathymetric surveys around the Operational Area show the seabed is relatively flat and featureless. The Ancient coastline at 125 m depth contour KEF overlaps the Operational Area. Given localised nature and short duration of the activities, removal of the Eaglehawk-1 wellhead and guidebases will not impact the features of the Ancient Coastline at 125 m Depth Contour KEF. Physical impacts from the Petroleum Activities Program are expected to be for the most part confined to sediment burrowing infauna and surface epifauna invertebrates, particularly filter feeders, inhabiting the seabed directly on and around the wellheads. Removal of the wellheads will disturb these artificial habitats and associated fauna, with impacts expected to be localised and restricted to the footprint of the wellhead and small areas around it. Due to the widespread representation of the infauna communities within Operational Area and the broader region, impacts are expected to be negligible. Activities including AWJ cutting, ROV operation near, and placement of wellheads on the seabed prior to recovery may result in elevated turbidity resulting in suspension and relocating drill cuttings discharged during the drilling activity. However, the potential for toxic impacts to the benthic environment is negligible, considering that almost 50 years has passed since the was drilled, and that WBMs were used. Suspension of sediments due to increased turbidity can result in the clogging of respiratory and feeding parts of filter feeding organisms. However, elevated turbidity would only be expected to be very localised and for a short duration with no lasting effect and, therefore, will not have any significant impact to environment receptors. The physical presence of a portion of the infrastructure remaining in-situ above the mudline, if it cannot be removed at or below this level, has the potential to result in continued disturbance to the seabed and benthic habitats in the immediate vicinity around the wells until buried or fully corroded. Corrosion could result in the release of trace amount of metals (such as iron and manganese) to the water column and surrounding sediments. This process would occur over long timeframes (100s of years). Iron, the main constituent (around 98%) of the infrastructure, is not considered a significant contaminant in the marine environment (OSPAR PLONOR), is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997), and is an abundant element in marine sedimentary systems (Taylor et al., 2011). Given this and the small volume of material that may be left in-situ, impacts to benthic habitats will be negligible and no impacts would occur to any protected species.
Summary of Potential Impacts to Environmental Values(s)
Given the adopted controls, seabed disturbance from the Petroleum Activities Program will not result in a potential impact greater than a temporary impact to benthic communities with no lasting effect.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[4]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Sea Dumping Permit for leaving partial wellhead	Determined a permit under the Environment Protection (Sea Dumping) Act 1981 is not required, given the infrastructure is considered to fall under the			No

[4] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[4]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
in-situ if internal cut and external cut at the mudline cannot be achieved.	scope of article 1.4.2.3 of the London Protocol, which states that sea dumping does not include the 'abandonment in the sea of matter (such as cables, pipelines and marine research devices) placed for a purpose other than the mere disposal thereof'.			
Professional Judgement – Eliminate				
If external cut is required using diamond wire saw, dredge sediments surrounding the wells to allow cut at or below the mudline	F: Yes CS: Minimal to moderate.	Impact from dredging a significant amount of sediment would have short- to medium-term impacts (e.g. temporary reduction in water quality, greater footprint of disturbance to sediments and benthic habitats) that outweigh long-term impacts expected from a small amount of infrastructure being left above the mudline.	Control grossly disproportionate and impacts to benthic habitats from adopting control are considered to outweigh impacts from leaving a portion of well infrastructure in-situ if unable to be removed.	No
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 to conducting the activities CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
ALARP Statement Relevant tools appropriate to the decision type (i.e. Decision Type A) have not identified any appropriate controls to manage the impact of seabed disturbance. 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 disturbance to the seabed will result in negligible impact to benthic communities with no lasting effect. Further opportunities to reduce the impact have been investigated above. The potential impacts and risks are considered broadly acceptable. On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability outlined in **Section 2.7**, this is considered an acceptable level of impact.				

7.6.3 Routine Acoustic Emissions: Vessels, Helicopters and Mechanical Equipment Operation

Context		
Project Vessels – **Section 4.6.3** Helicopters – **Section 4.9**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Generation of noise from project vessels and helicopters during normal operations						X		A	F	-	-	LCS	Broadly acceptable	NA
Generation of noise from cutting equipment						X		A	F	-	-	LCS		

Description of Source of Impact

During the Petroleum Activities Program, both atmospheric and underwater noise will be generated from the project vessels, helicopters and wellhead cutting. Project vessels will be present for up to 10 days, helicopter operation will occur intermittently within the 10 day duration.

Project Vessels

Project vessels will generate noise, due to the operation of thruster engines, propeller cavitation, on-board machinery etc. These noises 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).

The sound level and frequency characteristics ('signature') of discernible ships depend on their size, number of propellers, number and type of propeller blades, blade biofouling condition and machinery/transmission maintenance condition. A typical general support vessel's peak frequency or band ranges from 1–500 Hz at a peak source level of 170-190 dB re 1 µPa at 1 m. Larger vessel peak source levels have been presented in Arveson and Vendittis (2000). Larger vessels such as the offshore support vessels may generate marginally higher peak source level (e.g. a 1-2 dB re 1 µPa at 1 m peak source level increase compared to a smaller general support vessel). It is considered the sounds levels from project vessels used for this Petroleum Activities Program be in the range of 170-192 dB re 1 µPa at 1 m at 1–500 Hz.

Generation of Underwater Noise from Positioning Equipment

An array of LBL and/or USBL transponders may be installed on the seabed for metrology and positioning. Transponders typically emit pulses 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. 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).

Helicopters

Helicopter engines and rotor blades are recognised as a source of noise emissions, which may constitute a source of environmental risk resulting in behavioural disturbance to marine fauna. Helicopter activities may occur in the Operational Area, including the landing and take-off of helicopters on the offshore support vessel helideck. Sound emitted from helicopter operations is typically below 500 Hz (Richardson et al., 1995). The peak received level diminishes with increasing helicopter altitude, but the duration of audibility often increases with increasing altitude.

Richardson et al. (1995) reports that helicopter sound is audible in air for four minutes before it passed over underwater hydrophones, but detectable underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m depth. Noise levels reported for a Bell 212 helicopter during fly-over was reported at 162 dB re 1 µPa and for Sikorsky-61 is 108 dB re 1 µPa at 305 m (Simmonds et al., 2004).

Wellhead Removal

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 AWJ cutting method, or mechanical cutting method.

Twachtman et al. (2004) studied the operations and socioeconomic impact of nonexplosive 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 2018). 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 AWJ 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 project vessel on DP immediately above the wellhead locations. As such, noise from the cutting of the casing and conductors will not add to cumulative noise levels for the operation to any extent.

Table 7-2 outlines a summary of the noise emissions associated with the Petroleum Activities Program.

Table 7-2: Summary of noise emissions

Activity	Noise level	Frequency	Type
Project vessels	170-190 dB re 1 µPa at 1 m.	1 Hz–5 kHz	Continuous
Helicopter	162 dB re 1 µPa 108 dB re 1 µPa at 305	<500 Hz	Continuous
Cutting	136 -141 dB SPL at 10 m	~5 kHz	Continuous
Transponders	180 to 206 dB re 1 µPa at 1 m	21 to 31 kHz	Intermittent

Both continuous and impulsive noise sources are associated with the Petroleum Activities Program (**Table 7-2**). Continuous noise is a category of sound that is described by a continual non-pulsed sound. Continuous sound can be tonal, broadband, or both. Some of these non-pulse sounds can be transient signals of short duration but without the essential properties of pulses (e.g. rapid rise-time) (Southall et al., 2007). Due to the continuous non-pulsed properties of continuous noise, the risk and severity of potential impact to marine fauna is lower than that of impulsive noise.

Impact Assessment

Potential Impacts to Environmental Values

Change in Fauna Behaviour

Elevated underwater noise can result in changes to marine fauna behaviour 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 (Richardson et al., 1995).

The sensitivity of fauna behaviour to elevated noise levels vary both inter- and intra-specifically, with individual responses often being influenced by the present behaviour, such as reproductive behaviours, foraging or migration.

Thresholds, where appropriate, for behavioural response of different species to noise are discussed in the sections that follow.

Injury/Mortality to Fauna

In some cases, injury or morality to marine fauna can occur due to elevated noise levels by causing direct physical effects on hearing or other organs, including (Richardson et al., 1995):

- potential for mortality/mortal injury resulting from exposure to noise (considered negligible given the noise sources associated with the Petroleum Activities Program, with the exception of plankton)
- permanent Threshold Shift (PTS) – permanent reduction in the ability to perceive sound after being exposed to noise
- temporary Threshold Shift (TTS) – temporary reduction in the ability to perceive sound after being exposed to noise, with hearing returning to normal.

Exposure to sufficiently intense sound may lead to an increased hearing threshold. If this shift is reversed and the hearing threshold returns to normal, the effect is called a temporary threshold shift (TTS). Southall et al., 2007 defined TTS as a threshold shift of 6 dB above the normal hearing threshold. If the threshold shift does not return to normal, permanent threshold shift (PTS) has occurred. Threshold shifts can be caused by acoustic trauma from a very intense sound of short duration, as well as from exposure to lower level sounds over longer time periods (Houser et al., 2017).

Cetaceans/marine mammals

Behavioural reactions to acoustic exposure are generally more variable, context-dependent, and less predictable than the effects of noise exposure on hearing or physiology. This is because behavioural responses to anthropogenic sound depend upon operational and environmental variables, and on the physiological, sensory and psychological characteristics of exposed animals. It is important to note that the animal variables may differ (greatly in some cases) among individuals of a species, and even within individuals, depending on various factors (e.g. sex, age, previous history of exposure, season, animal activity). However, within certain similar conditions, there appears to be some relationship between the sound exposure level and the magnitude of behavioural response.

For low-frequency cetaceans, such as baleen whales, the frequency of the transponder signals are at the upper limit of the group's auditory bandwidth (7Hz to 22kHz, Southall (2007)) and are therefore, unlikely to impacted by the use of transponders.

For continuous noise, only weighted- sound exposure level (SEL) metrics are provided in the literature (**Table 7-3**). Estimating SEL provides a metric that integrates cumulative exposures. For PTS and TTS thresholds to continuous noise, 24 hours has been provided as a suitable timeframe to estimate SEL. Continuous noise generated from the Petroleum Activities Program is expected to be up to 192 dB re 1 µPa at 1 m and impulsive noise 206 dB re 1 µPa at 1 m (**Table 7-2)**. However, the potential for received levels to exceed weighted thresholds defined for PTS or TTS for marine mammals is very low due to the cetacean's mobility and ability to avoid the sound sources.

Table 7-3: Noise exposure criteria for onset of TTS and PTS from continuous and impulsive noise (NMFS 2018) and behavioural response (NMFS 2013)

Hearing group	PTS onset thresholds (received level) (Weighted SEL_{24h} :$L_{E,24h}$; dB re 1 µPa^2·s)		TTS onset thresholds (received level) (Weighted SEL_{24h} :$L_{E,24h}$; dB re 1 µPa^2·s)		Behavioural response (Sound Pressure Level: L_p; dB re 1 µPa)	
	Continuous	Impulsive	Continuous	Impulsive	Continuous	Impulsive
Low-frequency cetaceans	199	183	179	168	120	160
Mid-frequency cetaceans	198	185	178	170	120	160
High-frequency cetaceans	173	155	153	140	120	160

Marine mammals that may occur within the Operational Area are provided in **Section 5.6.3**, however, the Operational Area does not overlap any marine mammal BIAs.

Cumulative noise impacts from the use of multiple vessels is not considered to present significant impacts to cetaceans given their mobility and ability to avoid the sound source. Impacts will relate to behavioural disturbance / avoidance only.

Turtles

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). Electro physical studies have indicated that the best hearing range for marine turtles is in the 100 to 700 Hz range (Bartol and Musick, 2003).

Popper et al., (2014) provided injury thresholds for turtles (>207 dB PK) for impulsive sound but none exist for continuous noise. Additionally, no thresholds were provided for behavioural disturbance. For continuous noise sources, such as vessel operations, marine turtles have been shown to avoid low-frequency sounds (Lenhardt, 1994). Further, in a playback study of diamondback terrapins (*Malaclemys terrapin terrapin*) using boat noise, some animals were observed to increase or decrease swimming speed while others did not alter their behaviour at all (Lester et al., 2013).

The Operational Area does not overlap with the any marine turtle BIAs or critical habitats meaning individuals may transit through the Operational Area but aggregations are not expected. in the petroleum Activities Program may result in a short term (up to 10 days) localised behavioural response to individuals transiting through the Operational Area,

with no lasting effect. Individuals may deviate slightly from their activities but are expected resume normal behaviours as they move away from the activities.

Fish

Guideline noise levels criteria from Popper et al. (2014) provide impact threshold for shipping and other continuous noise sources to Type 3 fish (swim bladder involved in hearing) at 170 dB re 1 µPa (SPL) over 48 hours for recoverable injury, and 158 dB re 1 µPa (SPL) over 12 hours for TTS. Thresholds for Type 2 (swim bladder present but not involved in hearing) and Type 1 (no swim bladder) are absent, but indicate that risk of recoverable injury is low, even in the nearfield and the risk of TTS is moderate in the nearfield but low in intermediate and far field. The risk of mortality is considered low for all fish types even in the nearfield. In absence of more conclusive studies, these impact thresholds have been applied for conservatism.

None of the noise sources are expected to result in mortality of fish, of any type described by Popper et al (2014). Pelagic fish species, including sharks and rays, may display behavioural responses, such as avoidance of the area, within close proximity of the vessels. While continuous noise levels associated with vessel may exceed recoverable injury and TTS thresholds for Type 3 species, for pelagic species, it is unlikely that individuals will remain within areas of exceeded noise levels.

A foraging BIA for whale sharks is overlapped by the Operational Area. As a cartilaginous fish lacking a swim bladder, whale sharks are categorised as a Type 1 fish. Thresholds for mortality or injury from impulsive noise (>213 dB re 1 $\mu Pa^2 \cdot s$, Popper et al. 2014) are greater than any noise source of the Petroleum Activities Program. Type 1 fish are considered low risk of mortality or injury from continuous noise sources (Popper et al 2014) and thresholds for TTS (193 dB re 1 $\mu Pa^2 \cdot s$) exceed any continuous noise source level. In summary, impacts to whale sharks foraging within the BIA are not expected.

Summary of Potential Impacts to environmental value(s)

It is considered that noise generated by project vessels and helicopters will not result in a potential impact greater than short-term temporary disruption to a small portion of the population for any marine fauna species exposed, with no lasting effects.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [5]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
None identified.				
Good Practice				
The use of dedicated Marine Fauna Observers (MFOs) on support vessels for the duration of the Petroleum Activities Program to watch for cetaceans 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 general support vessel bridge crews already maintain a constant watch during operations, additional MFOs would not further reduce the likelihood of an individual being within close proximity of the acoustic source during start-up or during operations.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
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				
None identified.				

[5] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [5]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Professional Judgement – Engineered Solution				
None identified.				
ALARP Statement				
Relevant tools appropriate to the decision type (i.e. Decision Type A) have not identified any appropriate controls to manage the impact of noise emissions. 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, project vessel noise disturbance are unlikely to result in a potential impact greater than localised and temporary disruption to a small proportion of the population, with no lasting effects, and no impact on critical habitat or activity. Further opportunities to reduce the impact have been investigated above. The potential impacts and risks are considered broadly acceptable. On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability, this is considered an acceptable level of impact.

7.6.4 Routine Atmospheric Emissions: Fuel Combustion

Context		
Project Vessels – **Section 4.6.3** Helicopters – **Section 4.9**	Physical Environment – **Section 5.4**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Exhaust emissions from internal combustion engines and incinerators on project vessels and helicopters within the Operational Area.				X				A	F	-	-	LCS	Broadly Acceptable	EPO 4

Description of Source of Impact

One to two project vessels will be present in the Operational Area for up to 10 days Atmospheric emissions will be generated by these project vessels from internal combustion engines (including all equipment and generators) and incineration activities (including onboard incinerators) during the Petroleum Activities Program. Emissions will include SO_2, NO_x, ozone depleting substances, CO_2, particulates and volatile organic compounds (VOCs).

Impact Assessment

Potential Impacts to Environmental Values

Fuel combustion has the potential to result in localised, temporary reduction in air quality. Potential impacts include a localised reduction in air quality and contribution to greenhouse gas emissions. Given the short duration and exposed location of project vessels (which will lead to the rapid dispersion of the low volumes of atmospheric emissions), the potential impacts are expected to be localised and of no lasting effect.

Summary of Potential Impacts to Environmental Values(s)

Given the adopted controls, it is considered that the release of a small volume of greenhouse gases will not result in a potential impact greater than a localised impact to local air quality with no lasting effect.

Demonstration of ALARP

Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [6]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Marine Order 97 (Marine Pollution Prevention – Air Pollution), which details requirements for: • International Air Pollution Prevention (IAPP) Certificate,	F: Yes CS: Minimal cost	Legislative requirements to be followed may reduce the consequences of air pollution.	Control based on legislative requirements – must be adopted	Yes **C 3.1**

[6] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [6]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
required by vessel class • use of low sulphur fuel • Ship Energy Efficiency Management Plan, where required by vessel class • onboard incinerator to comply with Marine Order 97.				
Good Practice				
None identified.				
Professional Judgement – Eliminate				
Do not combust fuel.	F: No. There are no 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
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
ALARP Statement On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e. Decision Type A), Woodside considers the adopted controls appropriate to manage the potential impacts of release of atmospheric emissions within the Operational Area. 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, atmospheric emissions during the Petroleum Activities Program will not result in a potential impact greater than a temporary decrease in local air quality with low impact to the environment or human health and no lasting effects. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, Woodside considers the adopted controls appropriate to manage the impacts of the described emissions within the Operational Area to a level that is broadly acceptable.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 3 Fuel combustion emissions and incineration during the Petroleum Activities Program will be in compliance with marine order requirements to restrict emissions to those necessary to perform the activity.	**C 3.1** Marine Order 97 (Marine Pollution Prevention – Air Pollution) which details requirements for: • International Air Pollution Prevention (IAPP) Certificate, required by vessel class • use of low sulphur fuel when available • Ship Energy Efficiency Management Plan, where required by vessel class • onboard incinerator to comply with Marine Order 97.	**PS 3.1** 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 3.1.1** Marine Assurance inspection records demonstrate compliance with Marine Order 97.

7.6.5 Routine Discharge: Bilge Water, Grey Water, Sewage, Putrescible Wastes and Deck Drainage Water

Context		
Project Vessels – **Section 4.6.3**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Routine discharge of sewage, grey water and putrescible wastes to marine environment from project vessels within the Operational Area			X		X			A	F	-	-	LCS	Broadly acceptable	EPO 4
Routine discharge of deck and bilge water to marine environment from project vessels within the Operational Area			X		X			A	F	-	-			

Description of Source of Impact

One to two project vessels will be present in the Operational Area for up to 10 days. These 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 m³ per vessel 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 support vessels will have considerably less persons on board.
- routine/periodic discharge of relatively small volumes of bilge water. Bilge tanks on the project vessels receive fluids from many parts of the vessel. Bilge water can contain water, oil, detergents, solvents, chemicals, particles and other liquids or solids.
- variable water discharge from project vessel decks directly overboard or via deck drainage systems. Water sources could include rainfall events and/or from deck activities such as cleaning/wash-down of equipment/decks.

Environmental risk relating to the disposal/discharges above regulated levels or incorrect disposal/discharge of waste would be unplanned (non-routine/accidental) and are addressed in **Section 7.7.4.**

Impact Assessment

Potential Impacts to Environmental Values

Routine discharges generated from the Petroleum Activities Program have the potential to cause temporary and localised reduction in water quality. The main 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 monitored 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 of 50, 100 and 200 m downstream of the platform and at five different water depths confirmed that discharges were rapidly diluted and 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 Energy Limited, 2011). Mixing and dispersion would be further facilitated in deep offshore waters, consistent with the location of the Operational Area, 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).

Furthermore, open marine waters do not typically support areas of increased ecological sensitivity, due to the lack of nutrients in the upper water column and lack of light penetration at depth. Therefore, presence of receptors, such as fish, reptiles, birds and cetaceans, in significant numbers within the Operational Area is unlikely. Research also 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.

Other discharges outlined, which may include other non-organic contaminants (e.g. bilge water), will be rapidly diluted through the same mechanisms as above and are expected to be in very small quantities and concentrations as to not pose any significant risk to any relevant receptors.

As such, no significant impacts from the planned discharges that are listed above 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 Operational Area.

Summary of Potential Impacts to Environmental Values(s)

Given the adopted controls, it is considered that routine discharges described will not result in a potential impact greater than localised reduction in water quality with no lasting effect.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [7]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Marine Orders 95 – 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 consequence would result.	Controls based on legislative requirements – must be adopted.	Yes **C 4.1**
Marine Orders 96 - pollution prevention – sewage (as appropriate to vessel class), specifically: • a valid International Sewage Pollution Prevention (ISPP) Certificate, as required by vessel class • an ASMA approved sewage treatment plant	F: Yes CS: Minimal cost. Standard practice.	No reduction in consequence would result.	Controls based on legislative requirements – must be adopted.	Yes **C 4.2**

[7] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [7]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
• sewage commuting 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 3 nm from the nearest land • discharge of sewage will occur at a moderate rate while the vessel is proceeding (>4 knots), to avoid discharges in environmentally sensitive areas.				
Marine Orders 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.	F: Yes CS: Minimal cost. Standard practice.	No reduction in consequence would result.	Controls based on legislative requirements – must be adopted.	Yes **C 4.3**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [7]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
• 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 <15 ppm without dilution or be treated by an IMO approved oil/water separator, they will be contained on-board and disposed of onshore. • a valid IOPP Certificate, as required by vessel class.				
Good Practice				
None identified.				
Professional Judgement – Eliminate				
Storage, transport and treatment/ disposal onshore treatment of sewage, greywater, putrescible and bilge wastes.	F: No. Would present additional safety and hygiene hazards resulting from the storage, loading and transport of the waste material. CS: Not considered – control not feasible.	Not considered – control not feasible.	Not considered – control not feasible.	No
Professional Judgement – Substitute				
None identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [7]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Professional Judgement – Engineered Solution				
None identified.				
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 impacts of planned routine discharges from the project vessels. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement
The impact assessment has determined that, given the adopted controls, planned (routine) discharges from projects vessels are unlikely to result in a potential impact greater than a temporary contamination above background levels and/or national/international quality standards and/or known biological effect concentrations outside a localised mixing zone with no lasting effect. 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 under Marine Orders 91, 95 and 96. 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 4 No impact to water quality greater than a consequence level of F[8] from discharge of sewage, greywater, putrescible wastes, bilge and deck drainage to the marine environment during the Petroleum Activities Program.	**C 4.1** Marine Orders 95 – 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.	**PS 4.1** Project vessels compliant with Marine Orders 95 – pollution prevention – Garbage.	**MC 4.1.1** Records demonstrate project vessels are compliant with Marine Orders 95 – pollution prevention (as appropriate to vessel class).
	C 4.2 Marine Orders 96 - pollution prevention – sewage (as appropriate to vessel class) specifically: • a valid International Sewage Pollution Prevention (ISPP) Certificate, as required by vessel class • an ASMA approved sewage treatment plant • sewage commuting and disinfecting system • a sewage holding tank sized appropriately to	**PS 4.2** Project vessels compliant with Marine Order 96 - pollution prevention – sewage (as appropriate to vessel class).	**MC 4.2.1** Records demonstrate project vessels are compliant with Marine Orders 96 - pollution prevention – sewage (as appropriate to vessel class).

[8] Defined as 'No lasting effect (<1 month) or negligible impact. Localised impact not significant to environmental receptors.'

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	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 3 nm from the nearest land • discharge of sewage will occur at a moderate rate while the vessel is proceeding (>4 knots), to avoid discharges in environmentally sensitive areas.		
	C 4.3 Marine Orders 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.	**PS 4.3** Deck drainage and bilge water will be discharged to meet the oil content standard of <15 ppm without dilution	**MC 4.3.1** Records demonstrate discharge specification met for project vessels.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	• 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 and deck drainage 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 of onshore. • a valid IOPP Certificate, as required by vessel class.		

7.6.6 Routine Discharge: Wellhead Removal and Recovery

Context		
Removal of Wellheads and Associated Infrastructure – **Section 4.10**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Discharge of grit and flocculant and/or metal swarf (from mechanical cutter, diamond wire saw) during removal of well infrastructure.		X	X		X	X		A	F	-	-	GP	Broadly acceptable	EPO 5
Discharge of displacement and casing annuli fluids during removal.														

Description of Source of Impact

Where AWJ cutting is selected (see **Section 4.10**) 4 tonne of grit and 250 L flocculant per well, with the majority or all of the discharge to be released below the mudline. Some very small volumes may be released to the surface sediments if the cut is made at, or close to the mudline. During physical removal of the wellhead some displacement fluids may also be discharged.

As the planned cutting depth is approximately 3 m below the mudline, discharges from cutting of well infrastructure using either a mechanical cutting tool, diamond wire saw or AWJ cutting method are expected to be confined predominately within the well and settle on the top permanent plug. During the final cut through the conductor pipe, small amounts of 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 and diamond wire saw, 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 AWJ 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.

All chemicals used for infrastructure removal are assessed in accordance with the Woodside Chemical Selection and Assessment Environment Guideline.

Impact Assessment

Potential Impacts to Environmental Values

The identified potential impacts associated with wellhead removal and recovery activities include localised and temporary reduction in water and localised change in seabed sediment quality, as well as localised burial of benthic biota (species) and change to habitats and communities.

A number of direct and indirect impact pathways are identified for these discharges, including:

- temporary increase in total suspended solids (TSS) in the water column

- sediment deposition to the seabed, leading to minor alteration of the physico-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.

The Operational Area is situated in offshore waters (approximately 127 km from Dampier) in water depths of approximately 120 m. The abiotic habitat in the area is likely comprised of deep, soft, unconsolidated sediment, which is relatively flat and featureless.

If removal of infrastructure results in discharges to the seabed then this will result in localised disturbance to the sediments and communities immediately surrounding the well infrastructure and potentially localised temporary increases in turbidity, with no toxicological effects.

Any increased turbidity and TSS levels in the water column will be temporary and highly localised at the point of discharge. Nelson et al. (2016) identified less than 10 mg/L TSS has no effect or sub-lethal minimal effect concentration. Given the generally low concentration of TSS (due to rapid dispersion the offshore open ocean site in conjunction with rapid dispersion of sediment, the very small volumes of discharge and the short period of intermittent discharge impacts to water quality are expected to be negligible with no impacts to any protected species.

Summary of Potential Impacts to Environmental Values(s)

Discharges as a result of wellhead removal will not result in a potential impact greater than localised burial and smothering of benthic habitats and negligible effects to water quality (e.g. turbidity increase) with no lasting effect (i.e. Environment Impact – F). Any localised impacts to water quality, sediment quality and marine fish is not expected to impact any commercial fishers in the area.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [9]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
None identified.				
Good Practice				
Fluids and additives planned to be used and intended or likely to be discharged to the marine environment will have an environmental assessment completed before use.	F: Yes CS: Minimal cost. Standard practice.	Environmental assessment of chemicals will reduce the consequence of impacts resulting from discharges to the marine environment by ensuring chemicals have been assessed for environmental acceptability. Planned discharges are required for the safe execution of activities and therefore no reduction in likelihood can occur.	Benefits outweigh cost/sacrifice.	Yes **C 5.1**
Chemical reviews will be performed on all previously approved chemicals to confirm potential chemical impacts are reduced to ALARP.	F: Yes CS: Minimal cost. Standard practice.	Regular reviews will ensure chemicals selected for drilling and completions fluids remain ALARP.	Benefits outweigh cost/sacrifice.	Yes **C 5.2**
Recovery of displacement/annuli fluids	F: No – fluids cannot be isolated prior to wellhead removal. Wellhead removal cannot occur	Not considered – control not feasible.	Not considered – control not feasible.	No

[9] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [9]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
	without release of fluids to the marine environment CS: Not considered – control not feasible.			
Professional Judgement – Eliminate				
None identified.				
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
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, standard 'good practice' controls appropriate to manage the impacts of wellhead removal discharges.				

Demonstration of Acceptability
Acceptability Statement The impact assessment has determined that, given the adopted controls, planned (routine) discharges from the removal of wellhead infrastructure is unlikely to result in a potential impact greater than a temporary increase in turbidity immediately surrounding the wellhead with no lasting effect. The adopted controls are considered good practice. 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 5 No impact to water quality or marine biota greater than a consequence level of F[10] from discharge of grit and flocculant during the Petroleum Activities Program.	**C 5.1** Fluids and additives planned to be used and intended or likely to be discharged to the marine environment will have an environmental assessment completed before use.	**PS 5.1** All chemicals (excluding legacy chemicals that may be present in the wellbore) intended or likely to be discharged to the marine environment reduced to ALARP using the chemical assessment process.	**MC 5.1.1** Records demonstrate chemical selection, assessment and approval process selected chemicals is followed.
	C 5.2 Chemical reviews will be performed on all previously approved chemicals to confirm potential chemical impacts are reduced to ALARP.	**PS 5.2** Acceptability of previously approved chemicals are re-evaluated to ensure ALARP and alternatives are considered.	**MC 5.2.1** Records confirm reviews have occurred.

[10] Defined as 'No lasting effect (less than one month); localised impact not significant to environmental receptors'.

7.6.7 Routine Light Emissions: External Lighting on Project Vessels

Context		
Project Vessels – **Section 4.6.3**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Routine light emissions from project vessels within the Operational Area.						X		A	F	-	-	GP	Broadly acceptable	N/A

Description of Source of Impact

Routine light emissions include light sources that alter the ambient light conditions in an environment. Project vessels will routinely use external lighting to navigate and conduct safe operations at night throughout the Petroleum Activities Program. External light emissions from project vessels are typically managed to maintain good night vision for crew members. Vessel lighting will also be used to communicate the vessel's presence to other marine users (i.e. navigation/warning lights). Lighting is required for safely operating project vessels and cannot reasonably be eliminated.

One to two vessels will be present in the Operational Area for up to 10 days. The vessels that may be required for the Petroleum Activities Program in the Operational Area are outlined in **Section 4.6.3**. External lighting is located on the vessel decks, with most external lighting directed towards working areas such as the main decks.

Historically, vessels used a combination of high-pressure sodium (HPS), fluorescent, metal halide and mercury vapour lights. However, recent advances in light emitting diode (LED) technology has seen a switch to this more efficient and cost-effective technology. Since the project vessels have not yet been contracted, the specific lighting design is unknown but is expected to comprise any or a combination of the light types mentioned above.

Lighting from vessels may appear as a direct light source from an unshielded lamp with direct line of sight to the observer or through sky glow. Direct lighting falling upon a surface is referred to as light spill. Sky glow is the diffuse glow caused by light that is screened from view, but through reflection and refraction creates a glow in the atmosphere. The distance at which direct light and sky glow may be visible from the source depends on the vessel lighting and environmental conditions.

Impact Assessment

Potential Impacts to Environmental Values

Receptors that have important habitat within a 20 km buffer of the Operational Area 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) (Commonwealth of Australia, 2020). 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 can affect fauna in two main ways:

- Intrinsic behaviour: Many species are adapted to natural levels of lighting and the natural changes associated with the day and night cycle as well as the night-time phases of the moon. However, artificial lighting has the potential to create a constant level of light at night that can override light cues directing behaviours.

- Orientation: Species such as marine turtles and birds may also use lighting from natural sources to orient themselves in a certain direction at night. If an artificial light source is brighter than a natural source, the artificial light may override natural cues, leading to disorientation.

The fauna within and immediately adjacent to the Operational Area are predominantly pelagic fish and zooplankton, with a low abundance of transient species such as marine turtles, whale sharks, cetaceans and migratory shorebirds and seabirds.

Marine Turtles – Hatchlings

The nearest nesting site is greatly exceeds the 20 km buffer set by the NLPG (>100 km to Rosemary and Legendre islands); therefore, sky glow and light spill from project vessels will not reach any nesting beach. At this distance, the density of hatchlings is expected to have declined, reducing the likelihood of individuals encountering the project vessels. Additionally, given the distance from the nearest turtle nesting beaches, hatchlings will not be undertaking nearshore dispersal, but moving more passively in their pelagic phase where light cues may be less important.

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

Marine Turtle – Adults

Although individuals undertaking behaviours such as internesting, migration, mating (adults) or foraging (adults and pelagic juveniles) may occur within Operational Area, marine turtles do not use light cues to guide these behaviours. Furthermore, there is no evidence, published or anecdotal, to suggest that internesting, mating, foraging or migrating turtles are impacted by light from offshore vessels. As such, light emissions from the vessels are unlikely to result in displacement of, or behavioural changes to, individuals in these life stages (Pendoley Environmental, 2020). Considering the distance to the nearest nesting beaches (>100 km) impacts to nesting marine turtles are not expected.

No marine turtle BIAs or critical habitats overlap the Operational Area. The presence of marine turtles in the Operational Area is likely to be limited to individuals temporarily transiting the area. As such, light emissions from project vessels are unlikely to result in more than localised behavioural disturbance to isolated transient individuals, with no lasting effect to the species.

Seabirds and Migratory Shorebirds

Artificial lighting can attract and disorient seabird species resulting in species behavioural changes (e.g. circling light sources or disrupted foraging), injury or mortality near the light source as a result of collision (Longcore and Rich, 2004; Gaston et al., 2014). The Operational Area may be occasionally visited by seabirds and migratory shorebirds; however, there is no emergent land that could be used for roosting or nesting habitat within the Operational Area. While the Operational Area does not overlap with any BIAs or critical habitat for any bird species, a foraging BIA for wedge-tailed shearwaters is located 3 km from the Operational Area. At this distance, light sources associated with the Petroleum Activities Program may be visible to a low number of foraging individuals. Behavioural responses, such as attraction to the vessel lights, are possible however, the vulnerability to negative impacts of artificial light is lower at sea compared to individuals at breeding colonies, due to the lower importance of light cues for guiding foraging behaviours.

The nearest shoreline is Legendre Island, located 109 km from the Operational Area. Since the Operational Area lies within the East Asian Australian Flyway (EAAF) for migratory shorebirds, individuals may migrate through the area, but due to the lack of suitable stopover features, large numbers are not expected.

The risk associated with collision from seabirds and shorebirds attracted to the light is considered to be low, given the duration of the activities and the expected abundance and habitat use of individuals within the Operational Area. Impacts are expected to be limited to temporary behavioural disturbance to individuals, with no lasting effect or displacement from important habitat.

Other Marine Fauna

Lighting from project vessel activities in the Operational Area may result in the localised aggregation of fish around the vessel. These aggregations of fish due to light are considered localised and restricted to the duration of activities (10 days). Krill or plankton may also aggregate around the source of light. These aggregations of fish, krill or plankton would be confined to a small area. Based on the short duration and localised nature of the Petroleum Activities Program, these aggregations are not expected to attract any marine mammals.

Summary of Potential Impacts to Environmental Values(s)

Light emissions from project vessels will not result in an impact greater than a localised and temporary disturbance to marine fauna in the vicinity of the Operational Area with no lasting effect to any species (i.e. Environmental Impact – F).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [11]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
None identified.				
Good Practice				
None identified.				
Where activities will occur during the breeding period (August–April) for wedge-tailed shearwaters the following measures will be implemented, consistent with the NLPG (2020): • extinguish outdoor/deck lights not necessary for safety and/or navigation at night • use available block-out blinds on portholes and windows not necessary for safety and/or navigation at night • manage seabird landings appropriately and report interactions.	F: Yes, however a minimum level of lighting is required on vessels for safety. CS: Costs associated with implementation.	Negligible reduction in consequence; the Operational Area does not occur within 20 km of important breeding colonies where individuals of vulnerable life stages occur (i.e. fledglings). While foraging individual's may occur, they are less likely to be attracted to, and negatively impacted by, artificial light.	Due to the negligible reduction in consequence the benefit of the control is also considered to negligible. While costs are also low, they remain disproportionate the benefit.	No
Good Practice				
None identified.				
Professional Judgement – Eliminate				
Restrict the Petroleum Activities Program to daylight hours, eliminating the need for external work lights	F: Yes. Restricting the Petroleum Activities Program to daylight hours is technically feasible, although not considered to be reasonably practicable. CS: Significant cost sacrifice. Limiting the Petroleum Activities Program to daylight hours would significantly increase the duration of the Petroleum Activities Program, and therefore result in additional impacts from other sources (e.g. interference	Negligible reduction in consequence given the duration and nature of the activity.	Grossly disproportionate. Implementation of the control requires considerable cost sacrifice for minimal environmental benefit.	No

[11] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)*** [11]	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
	with other marine users, noise, vessel discharges, or potential for unplanned risks.			
Substitute external lighting with light sources designed to minimise impacts and marine turtles (as per NLPG 2020 management actions): • use flashing/intermittent lights instead of fixed beam • use motion sensors to turn lights on only when needed • use luminaires with spectral content appropriate for the species present • avoid high intensity light of any colour.	F: Yes. Replacement of external lighting with lighting appropriate for turtles is technically feasible, although is not considered to be practicable. CS: Significant cost sacrifice. The retrofitting of all external lighting on vessels would result in considerable cost and time expenditure. Considerable logistical effort to source sufficient inventory of the range of light types onboard vessels.	Given the potential impacts to turtles during this activity are insignificant, implementation of this control would not result in a reduction in consequence.	Grossly disproportionate. Implementation of the control requires considerable cost sacrifice for minimal environmental benefit. The cost/sacrifice outweighs the benefit gained.	No
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
ALARP Statement On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e. Decision Type A), Woodside considers the potential impacts from routine light emissions from project vessels within the Operational Area to be ALARP. This includes consideration of the nature of light emissions for the duration of the Petroleum Activities Program, and the requirements for external lighting for safe operations. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement The impact assessment has determined that routine light emissions from project vessels may result in impacts limited to temporary behavioural disturbance to marine fauna within a localised area and with no lasting effect on any species. Further opportunities to reduce the impacts have been investigated above. 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. Therefore, Woodside considers standard operations appropriate to manage the impacts and risks of routine light emissions to a level that is broadly acceptable.

7.7 Unplanned Activities (Accidents, Incidents, Emergency Situations)

7.7.1 Quantitative Spill Risk Assessment Methodology

Quantitative hydrocarbon spill modelling was undertaken by RPS (2021), on behalf of Woodside, using a three-dimensional (3D) hydrocarbon spill trajectory and weathering model, SIMAP (Spill Impact Mapping and Analysis Program), which is designed to simulate the transport, spreading and weathering of specific hydrocarbon types under the influence of changing meteorological and oceanographic forces.

A stochastic modelling scheme was followed in this study, whereby SIMAP was applied to repeatedly simulate the defined credible spill scenarios using different samples of current and wind data. These data samples were selected randomly from an historic time-series of wind and current data representative of the study area. Results of the replicate simulations were then statistically analysed and mapped to define contours of percentage probability of contact at identified thresholds around the hydrocarbon release point.

The model simulates surface releases and uses the unique physical and chemical properties of a hydrocarbon type to calculate rates of evaporation and viscosity change, including the tendency to form oil in water emulsions. Moreover, the unique transport and dispersion of surface slicks and in-water components (entrained and dissolved) are modelled separately. Thus, the model can be used to understand the wider potential consequences of a spill, including direct contact of hydrocarbons due to surface slicks (floating hydrocarbon) and exposure of organisms to entrained and dissolved aromatic hydrocarbons in the water column.

During each simulation, the SIMAP model records the location (by latitude, longitude and depth) of each of the particles (representing a given mass of hydrocarbons) on or in the water column, at regular time steps. For any particles that contact a shoreline, the model records the accumulation of hydrocarbon mass that arrives on each section of shoreline over time, less any mass that is lost to evaporation and/or subsequent removal by current and wind forces.

The collective records from all simulations are then analysed by dividing the study region into a 3D grid. For surface hydrocarbons (floating oil), the sum of the mass in all hydrocarbon particles located within a grid cell, divided by the area of the cell, provides hydrocarbon concentration estimates in that grid cell at each model output time interval. For entrained and dissolved aromatic hydrocarbon particles, concentrations are calculated at each time step by summing the mass of particles within a grid cell and dividing by the volume of the grid cell. The process is also subject to the application of spreading filters that represent the expected mass distribution of each distinct particle. The concentrations of hydrocarbons calculated for each grid cell, at each time step, are then analysed to determine whether concentration estimates exceed defined threshold concentrations.

All hydrocarbon spill modelling assessments undertaken by RPS undergo initial sensitivity modelling to determine appropriate time to add to the simulation after the cessation of the spill. The amount of time following the spill is based on the time required for the modelled concentrations to practically drop below threshold concentrations anywhere in the model domain in the test cases. This assessment is done by post-processing the sensitivity test results and analysing time-series of median and maximum concentrations in the water and on the surface.

7.7.1.1 Hydrocarbon Characteristics

As part of the risk identification process, Woodside identified the range of credible hydrocarbon spill scenarios that may occur from the Petroleum Activities Program. These scenarios are considered in the risk assessments of accidental hydrocarbon spill scenarios (refer to **Section 7.7.2**).

The characteristics of the hydrocarbons, used as the basis for the modelling studies used to inform the assessment, are summarised in **Table 7-4**.

Table 7-4: Hydrocarbon characteristics

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	
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	-	-

7.7.1.2 Environment that May Be Affected and Hydrocarbon Contact Thresholds

The outputs of the quantitative hydrocarbon spill modelling were used to assess the environmental consequence, if a credible hydrocarbon spill scenario occurred, in terms of 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 EMBA.

As the weathering of different fates of hydrocarbons (surface, entrained and dissolved) differs due to the influence of the metocean transport mechanisms, the EMBA combines the potential spatial extent of the different fates. The EMBA also includes areas that are predicted to experience shoreline contact with hydrocarbons above threshold concentrations.

The EMBA covers a larger area than the area that is likely to be affected during any single spill event, as the model was run for a variety of weather and metocean conditions, and the EMBA represents the total extent of all the locations where hydrocarbon thresholds could be exceeded from all modelling runs. Furthermore, as the weathering of different fates of hydrocarbons (surface, entrained and dissolved) differs due to the influence of the metocean transport mechanism, a different EMBA is presented for each fate. These EMBA together define the spatial extent for the existing environment, which is described in **Section 5**. Hydrocarbon contact below the defined thresholds may occur outside the EMBA and socio-cultural EMBA; however, the effects of these low exposure values will be limited to temporary exceedance of water quality triggers. The area within which this may occur in the event of a worst-case credible spill is presented in **Appendix D: Figure 5-1**.

The spill modelling outputs are presented as areas that meet threshold concentrations for surface, entrained and dissolved hydrocarbons for the modelled scenarios. Surface spill concentrations are expressed as grams per square metre (g/m^2), with entrained and dissolved aromatic hydrocarbon concentrations expressed as parts per billion (ppb). A conservative approach—adopting accepted contact thresholds that are documented to impact the marine environment—is used to define the EMBA.

Hydrocarbon thresholds are presented **Table 7-5** and described in the following subsections.

Table 7-5: Summary of thresholds applied to the quantitative hydrocarbon spill risk modelling results

Hydrocarbon Fate	Units	EMBA	Socio-cultural EMBA
Surface Hydrocarbons	g/m^2	10	1
Shoreline hydrocarbons	g/m^2	100	10
Entrained hydrocarbons	ppb	100	100
Dissolved aromatic hydrocarbons	ppb	50	50

7.7.1.3 Scientific Monitoring

A planning area for scientific monitoring is also described in the Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**). This planning area has been defined with reference to the low exposure entrained value of 10 ppb detailed in NOPSEMA Bulletin #1 Oil Spill Modelling (2019). This low exposure threshold is based on the potential for exceeding water quality triggers.

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.

7.7.2 Accidental Hydrocarbon Release: Vessel Collision

Context		
Project Vessels – **Section 4.6.3**	Physical Environment – **Section 5.4** Biological Environment – **Section 5** Socio-economic Environment - **Section 5.9**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence/Impact	Likelihood	Current Risk Rating	ALARP Tools	Acceptability	Outcome
Hydrocarbon release to the marine environment due to a vessel collision (between Project vessels or third party vessels)			X		X	X	X	A	D	1	M	LCS GP	Acceptable	EPO 1 EPO 2 EPO 6

Description of Source of Risk

Background

Offshore project vessels can have a fuel capacity in excess of 1,000 m^3 that is distributed into multiple isolated tanks. Individual marine diesel tanks are typically less than 500 m^3 in volume; however for the purposes of a conservative indication of the risks associated with a vessel collision for the Petroleum Activities Program, Woodside has assumed a largest marine diesel tank volume of 500 m^3 for a project vessel.

One general support vessel may accompany the offshore support vessels during the Petroleum Activities Program. The marine diesel storage capacity of a support vessel can also be in the order of 1,000 m^3 (total), distributed into multiple isolated tanks, typically located mid-ship, and can range in typical size of 22-105 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.

Project vessels (offshore support vessels and general support vessel(s)) will be present in the Operational Area for the duration of the Petroleum Activities Program. This presence in the area will result in a navigational hazard for other marine users within the immediate area of the vessel (as discussed in **Section 7.6.1**).

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.

From a review of the ATSB marine safety and investigation reports, one vessel collision occurred in 2011–2012 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 activity support vessel off Barrow Island. Two other vessel collisions occurred in 2010, one in the port of Dampier, where an activity 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 connected 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 occurring.

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. The majority of these related to the grounding instances.

Credible Spill Scenario

For a vessel collision to result in the worst-case scenario of a hydrocarbon spill from the vessel 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 probability of the chain of events described above aligning, to result in a breach of fuel tanks resulting in a spill that could potentially affect the marine environment is considered remote. Given the offshore location of the Operational Area, vessel grounding is not considered a credible risk.

The environmental risk analysis and evaluation undertaken 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. These scenarios are summarised in **Table 7-6**. The scenarios consider damaged to single and multiple fuel storage tanks in the Project vessels due to various combinations of vessel-to-vessel scenarios.

The scenarios considered comprised of a collision of a project vessels with each other or with a third party vessel (i.e. commercial shipping, other petroleum related vessels and commercial fishing vessels). The likelihood of a collision was assessed as being remote, given 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 an operational vessel, and the construction and placement of storage tanks. For the purposes of this assessment a worst-case instantaneous loss of 500 m³ from a diesel tank has been considered.

Table 7-6 Assessment of potential vessel spill scenarios

Scenario	Hydrocarbon Volumes	Preventative and Mitigation Controls	Credibility	Max. Possible Volume loss (m^3)
Breach of support vessel fuel tanks due to collision with an offshore support vessel	Support vessel has multiple tanks typically ranging between 22 m^3 and 105 m^3 each.	Typically double wall, tanks which are located mid-ship (not bow or stern). Vessels are not anchored and steam at low speeds when relocating within the Operational Areas or providing stand-by cover. Normal maritime procedures would apply during such vessel movements.	**Not Credible** Collision between the offshore support vessel and general support vessel is highly unlikely. If it did occur it is highly unlikely to result in a breach of support vessel fuel tank given the slow vessel speeds (low energy contact from slow moving vessel).	105 m^3
Breach of offshore support vessel fuel tanks due to collision with general support vessel	An offshore support vessel has multiple marine diesel tanks typically ranging between 22 m^3 and 500 m^3 each.	Typically double wall, tanks which are located mid-ship (not bow or stern). Vessels are not anchored and steam at low speeds when relocating within the Operational Areas or providing stand-by cover. Normal maritime procedures would apply during such vessel movements.	**Not Credible** Collision between the offshore support vessel and general support vessel is highly unlikely. If it did occur it is highly unlikely to result in a breach of offshore support vessel fuel tank given the slow vessel speeds (low energy contact from slow moving vessel).	500 m^3
Breach of fuel tanks due to project vessel collision with third party vessel (including commercial shipping/fisheries)	A general support vessel has multiple tanks typically ranging between 22 m^3 and 105 m^3 each. An offshore support vessel has multiple	Typically double wall, tanks which are located mid-ship (not bow or stern).	**Credible** Collision of a Project vessel with a third party vessel could potentially result in a release from a fuel tank.	500 m^3

	marine diesel tanks typically ranging between 22 m^3 and 500 m^3 each.			

Quantitative Hydrocarbon Risk Assessment

Modelling was undertaken by RPS, on behalf of Woodside, to determine the fate of marine diesel released from a vessel collision within the Operational Area. The modelling assessed the extent of a marine diesel spill with a volume of 500 m^3 for all seasons, using a historic sample of wind and current data in the region. A total of 200 simulations were modelled with each simulation tracked for 35 days.

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 approximately 50% by mass would be expected to evaporate over the first day or two (refer to **Figure 7-1**). After this time the majority of the remaining hydrocarbon is entrained into the upper water column. In calm conditions, entrained hydrocarbons are likely to resurface. Seven days following the spill, approximately 45–50% would evaporate, 40–45% would entrain and approximately 10% would decay and a small proportion would be dissolved (refer to **Figure 7-1**).

Given the environmental conditions experienced in the Operational Area, 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 used in the modelling are provided in **Table 7-4.**

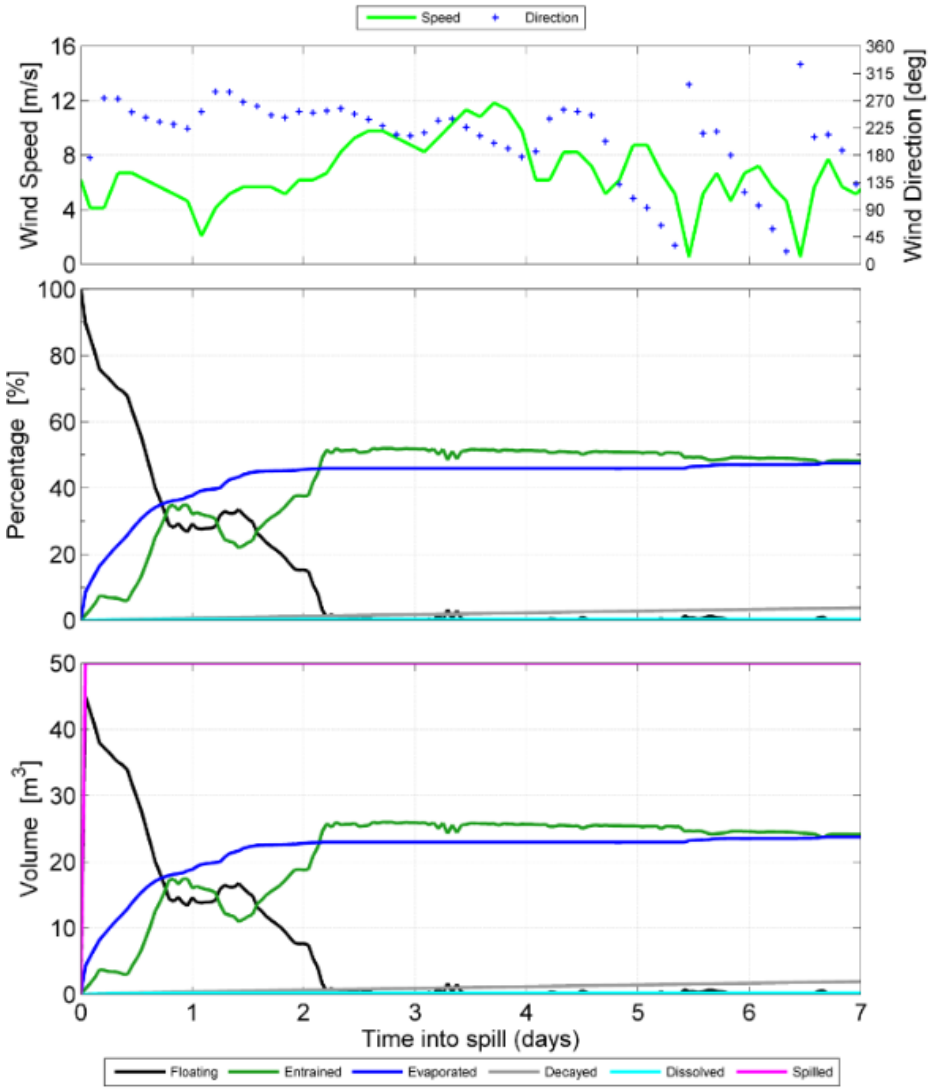


Figure 7-1: Proportional mass balance plot representing the weathering of marine diesel spilled onto the water surface as a one-off release (50 m^3 over one hour) and subject to variable wind at 27 °C water temperature and 25 °C air temperature

Impact Assessment

Potential Impacts Overview

Environment that May Be Affected

The overall EMBA for the Petroleum Activities Program is based on stochastic modelling, which compiles data from 200 hypothetical worst-case spills under a variety of weather and metocean conditions (as described in **Section 5.4**). The worst-case distances and probabilities of contact to receptor locations have been chosen as a conservative approach.

As the weathering of different fates of hydrocarbons (surface, entrained and dissolved) differs due to the influence of the metocean transport mechanism, a different EMBA is discussed for each fate.

Surface hydrocarbons

Quantitative hydrocarbon spill modelling results for surface hydrocarbons are shown in **Table 7-7**. The modelling indicates that the spill would be localised and confined to open water, extending up to approximately 50 km (at or above the 10 g/m^2 impact threshold) from the release location.

A socio-cultural EMBA for surface hydrocarbons which includes the threshold for visible surface hydrocarbons of 1 g/m^2 may extend up to approximately 40 km from the release site.

Entrained hydrocarbons

Quantitative hydrocarbon spill modelling results for entrained hydrocarbons are shown in **Table 7-7**. If a vessel collision scenario occurred, the plume of entrained hydrocarbons would largely form down-current of the release location, with the trajectory dependent on the 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 up to approximately 430 km from the release site. Concentrations above 100 ppb are not expected to exceed depths of approximately 30 m below mean sea level (BMSL).

In the event that this vessel collision scenario occurred, the probability of contact by entrained oil at concentrations above 100 ppb is predicted to be approximately 5% at Montebello Marine Park and 2% Barrow Island Marine Management Area.

Dissolved hydrocarbons

Quantitative hydrocarbon spill modelling results for dissolved hydrocarbons are shown in **Table 7-7**. The modelling indicates that locations exposed to dissolved hydrocarbons at or above the threshold concentration of 50 ppb are restricted to offshore areas up to approximately 160 km from the release site. Concentrations above 50 ppb are not expected to exceed depths of approximately 50 m BMSL.

There was a low (1%) probability that dissolved hydrocarbons above threshold concentrations (>50 ppb) would be detected at the Montebello Marine Park.

Accumulated hydrocarbons

No accumulation of hydrocarbons was predicted by the quantitative hydrocarbon spill modelling above 100 g/m^2.

Summary of Potential Impacts to Environmental Values

Table 7-7 presents the full extent of the EMBA, i.e. the sensitive receptors and their locations that may be exposed to hydrocarbons (surface, entrained and dissolved) at or above the set threshold concentrations in the unlikely event of a marine diesel spill from a vessel collision during the Petroleum Activities Program. Some receptors included in **Table 7-7** do not have a predicted probability of hydrocarbon contact due to extrapolation of the spill modelling results to each corner of the Operational Area for defining the EMBA**.** Details of these receptors are outlined in **Section 5.5**. The potential biological and ecological impacts of an accidental hydrocarbon release as a result of a vessel collision during the Petroleum Activities Program are expected to have minor, short term impacts to species and habitats, but not effecting ecosystem function, and are presented in detail in the following sections.

Table 7-7: Key receptor locations and sensitivities potentially contacted above impact thresholds by the vessel collision 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))																												Maximum predicted probability of hydrocarbon contact (>1% probability)[12]			
		Physical		*Biological*																			*Socio-Economic and Cultural*											
		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/Shipwrecks*	*Offshore Oil and Gas Infrastructure (topside and subsea)*				
		Open water – pristine	*Marine sediment – pristine*	*Coral reef*	*Seagrass beds/macroalgae*	*Mangroves*	*Spawning/nursery areas*	*Open water – productivity/upwelling*	*Non biogenic coral reefs*	*Offshore filter feeders and/or deep-water 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 (including foraging and internesting areas and significant nesting beaches)*	*Seasnakes*	*Whale sharks*	*Sharks and rays*	*Sea birds and/or migratory shorebirds*	*Pelagic fish populations*	*Resident/demersal fish*						*Surface hydrocarbon (≥1 g/m²)*	*Surface hydrocarbon (≥10 g/m²)*	*Entrained hydrocarbon (≥100 ppb)*	*Dissolved aromatic hydrocarbon (≥50 ppb)*
Australian Marine Parks	Argo-Rowley Terrace AMP	✓						✓							✓	✓			✓			✓	✓	✓		✓			✓		-	-	1	-
	Montebello AMP	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	11.5	1
Islands	Barrow Island	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	5.5	-
	Pilbara Islands (including Bessieres Island, Flat Island, Peak Island, and Serrurier Island)	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	5.5	-
	Montebello Islands (including Boodie Island and Middle Island)	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	2.5	-
Marine Parks (State)	Barrow Island MP (State)	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	4.5	-

[12] Note: the probability is based on stochastic modelling of 200 hypothetical worst-case spills under a variety of weather and metocean conditions.

	Barrow Island MMA	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	7	-
Reefs, shoals and banks[13]	Montebello Shoals	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓					-	-	2.5	-
	Penguin Bank	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓					-	-	2	-
	Poivre Reef	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓					-	-	3.5	-
	Rosily Shoals	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓					-	-	2	-
	Trap Reef	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓					-	-	1	-
	Tryal Rocks	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓					-	-	5.5	-

[13] Note: hydrocarbons can only accumulate on shorelines and do not accumulate on open ocean, submerged receptors, or receptors not fully emergent.

Summary of Potential Impacts to Environmental Values(s)
Summary of potential impacts to protected species
Marine Mammals (cetaceans and dugongs)
Marine mammals 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 (DWH Natural Resource Damage Assessment Trustees, 2016). This may result in the irritation of sensitive membranes such as the eyes, mouth, digestive and respiratory tracts and organs, impairment of the immune system, neurological damage (Helm et al., 2015), reproductive failure, adverse health effects (e.g. lung disease, poor body condition) and potentially mortality (DWH Natural Resource Damage Assessment Trustees, 2016). In a review of cetacean observations relating to a number of large-scale hydrocarbon spills, Geraci (1988) found little evidence of mortality associated with hydrocarbon spills. However, it was concluded that exposure to oil from the DWH resulted in increased mortality to cetaceans in the Gulf of Mexico (DWH Natural Resource Damage Assessment Trustees, 2016). Geraci (1988) did identify behavioural disturbance (i.e. avoiding spilled hydrocarbons) in some instances for several species of cetacean, suggesting that cetaceans have the ability to detect and avoid surface slicks. However, observations during spills have recorded larger whales (both mysticetes and odontocetes) and smaller delphinids travelling through and feeding in oil slicks. During the DWH spill, cetaceans were routinely seen swimming in surface slicks offshore (and nearshore) (Achinger Dias et al., 2017). Impacts to cetaceans depends on the exposure pathway; with exposure to entrained oil and surface slicks not expected to result in significant impacts due to the relatively volatile, non-persistent nature of the hydrocarbons. Direct toxic effects from external exposure are not expected to occur, although mucous membranes and eyes may become irritated. Indirect toxic effects, such as hydrocarbon ingestion through accumulation in prey, may occur. Baleen whales feeding within entrained hydrocarbon plumes may ingest hydrocarbons, potentially resulting in toxic effects (particularly fresh hydrocarbons near the release location). Five threatened and migratory, and four migratory cetacean species were identified by a search of the EPBC Act Protected Matters Database, as potentially occurring in the EMBA (refer to **Section 5.6**). The humpback whale Migration (north and south) BIA intersects with the EMBA approximately 40 km to the south of the Operational Area. Humpback whales migrate through the region from July to December each year. The pygmy blue whale may occur within the region during their northern migration from April to August. The dugong was also identified by a search of the EPBC Act Protected Matters Database, as potentially occurring in the EMBA (refer to **Section 5.6**). The dugong is known to inhabit protected shallow coastal areas, and feed on seagrass in waters less than 10 m. The presence of the species in the EMBA is expected to be limited to infrequent occurrences of individuals or small groups. Entrained hydrocarbons above threshold concentrations are predicted to reach Montebello and Barrow Islands, however the probability of this occurring is 1.5%. A loss of marine diesel from a vessel collision could result in a disruption to individual marine mammals transiting the EMBA. Such disruption could include behavioural impacts (e.g. avoidance of impacted areas), sub-lethal biological effects (e.g. skin irritation, irritation from ingestion or inhalation) and, in rare circumstances, death. However, such disruptions or impacts are not predicted to impact on the overall population viability of the species within the EMBA.
Marine Reptiles
Marine Turtles Adult sea turtles exhibit no avoidance behaviour when they encounter hydrocarbon slicks (National Oceanic and Atmospheric Administration 2010). Contact with surface slicks, or entrained hydrocarbon, can therefore, result in hydrocarbon adherence to body surfaces (Gagnon and Rawson 2010) causing irritation of mucous membranes in the nose, throat and eyes leading to inflammation and infection (National Oceanic and Atmospheric Administration 2010). Oiling can also irritate and injure skin which is most evident on pliable areas such as the neck and flippers (Lutcavage et al., 1995). A stress response associated with this exposure pathway includes an increase in the production of white blood cells, and even a short exposure to hydrocarbons may affect the functioning of their salt gland (Lutcavage et al., 1995). Hydrocarbons in surface waters may also impact turtles when they surface to breathe and inhale toxic vapours. Their breathing pattern, involving large ‘tidal’ volumes and rapid inhalation before diving, results in direct exposure to petroleum vapours which are the most toxic component of the hydrocarbon spill (Milton and Lutz 2003). This can lead to lung damage and congestion, interstitial emphysema, inhalant pneumonia and neurological impairment (National Oceanic and Atmospheric Administration 2010). Contact with entrained hydrocarbons can result in hydrocarbon adherence to body surfaces (Gagnon and Rawson 2010) causing irritation of mucous membranes in the nose, throat and eyes leading to inflammation and infection (Gagnon and Rawson 2010). The Operational Area does not overlap with any reptile BIAs. Due to the absence of potential nesting habitat and location offshore, the Operational Area is unlikely to represent important habitat for marine turtles (approximately 49 km from the boundary of the nearest listed critical habitat). It is however acknowledged that the EMBA overlaps BIAs for several species of marine turtle (refer to **Section 5.6.2**). In the event of a vessel collision, a marine diesel spill

Summary of Potential Impacts to Environmental Values(s)
may have a minor disruption to a small portion of the population; however, there is no threat to overall population viability. **Seasnakes** Impacts to seasnakes from direct contact with hydrocarbons are likely to result in similar physical effects to those recorded for marine turtles and may include potential damage to the dermis and irritation to mucus membranes of the eyes, nose and throat (ITOPF 2011). They may also be impacted when they return to the surface to breathe and inhale the toxic vapours associated with the hydrocarbons, resulting in damage to their respiratory system. In general, seasnakes frequent the waters of the continental shelf area around offshore islands and potentially submerged shoals (water depths <100 m) and while individuals may be present in the EMBA (refer to **Section 5.6.2**), their abundance is not expected to be high given the offshore location of the activity. Therefore, a hydrocarbon spill may have a minor disruption to a portion of the population but there is no threat to overall population viability.
Sharks and Rays
Impacts to sharks and rays may occur through direct contact with hydrocarbons and contaminate the tissues and internal organs either through direct contact or via the food chain (consumption of prey). In the offshore environment, it is probable that pelagic shark species are able to detect and avoid surface waters underneath hydrocarbon spills by swimming into deeper water or away from the affected areas. Therefore, any impact on sharks and rays is predicted to be minor and only a temporary disruption. Hydrocarbon contact may affect whale sharks through ingestion (entrained/dissolved hydrocarbons), particularly if feeding. The whale shark foraging BIA overlaps with the Operational Area, extending along the 200 m isobath. The species has a widespread distribution and is highly migratory nature. Subsequently, some individuals may transit through the Operational Area (located at 120 m) and the EMBA. Whale sharks that have direct contact with hydrocarbons within the spill affected area may be impacted but the consequences to migratory whale shark populations are likely to be minor.
Seabirds and/or Migratory Shorebirds
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 plumage fouling and hypothermia (loss of thermoregulation), decreased buoyancy and potential to drown, inability to fly or feed, anaemia, pneumonia and irritation of eyes, skin, nasal cavities and mouths (AMSA 2013, International Petroleum Industry Environmental Conservation Association 2004) and result in mortality due to oiling of feathers or the ingestion of hydrocarbons. Longer-term exposure effects that may potentially impact seabird populations include a loss of reproductive success (loss of breeding adults) and malformation of eggs or chick (AMSA 2013). The extent of the EMBA for a surface slick may result in impacts on feeding habitat, however this is not expected to result in a threat to the overall population viability of seabirds or shorebirds. As outlined in **Section 5.6**, 31 species of seabirds and/or migratory shorebirds were identified by the PMST as potentially occurring within the EMBA, including twelve threatened species. There are no BIAs for any bird species located within the Operational Area, however the EMBA overlaps with a breeding BIA for 5 species and a breeding and foraging BIA for the fairy tern (see **Table 5-12**). Accumulated hydrocarbons above threshold concentrations (>100 g/m^2) were not predicted to occur. Floating oil at concentrations equal to or greater than 1 g/m^2 are not predicted to contact any shoreline receptors. Therefore, no impacts are expected to important nesting habitat.
Summary of potential impacts to other habitats and communities
Benthic Fauna Communities
Benthic fauna communities associated within the submerged shoals and banks located in the EMBA (refer to **Section 5.5**) may be exposed to entrained hydrocarbons above threshold concentrations (>100 ppb). The modelling indicates that locations exposed to entrained hydrocarbons at or above the threshold concentration of 100 ppb are restricted to offshore areas up to approximately 430 km from the release site. Concentrations above 100 ppb are not expected to exceed depths of approximately 30 m BMSL. Dissolved hydrocarbons above threshold concentrations (>50 ppb) were not predicted by the modelling to occur at any sensitive receptor locations. Therefore, submerged shoals and banks located in the EMBA are expected to have limited contact with entrained hydrocarbons and no contact with dissolved hydrocarbons. A loss of marine diesel from a vessel collision may result in a very small area of seabed and associated epifauna and infauna exposed to hydrocarbons.

Summary of Potential Impacts to Environmental Values(s)
Plankton and Fish Communities
There is potential for plankton communities to be impacted by a marine diesel spill where entrained hydrocarbons thresholds are exceeded; however communities are expected to recover quickly (weeks/months) due to high population turnover (ITOPF, 2011). With the relatively small EMBA and the fast population turn-over of open water plankton populations, it is considered that any potential impacts will be low and temporary in nature. Fish populations in the open water offshore environment of the Operational Area and EMBA are highly mobile and can move away from a marine diesel spill. The spill-affected area will likely be confined to the upper surface layers. It is therefore unlikely that fish populations would be exposed to hydrocarbon contamination. Fish populations are likely to be distributed over a wide geographical area so impacts on populations or species level are considered to be negligible. Combined with these factors and the relatively small EMBA and the rapid dispersion of marine diesel, it is considered that any potential impacts will be negligible.
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 sub-lethal impacts from exposure to hydrocarbons, particularly if a spill coincides with spawning seasons or if a spill reaches nursery areas close to the shore (e.g. seagrass and mangroves) (ITOPF 2011). Fish spawning (including for commercially targeted species such as snapper and mackerel) mostly 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 unlikely event of a marine diesel spill there is an extremely low potential for entrained hydrocarbons to occur in the surface water layers above threshold concentrations in the shallow areas of the Operational Area. This, and the potential for possible lower concentration exposure for dissolved aromatic hydrocarbons, have a negligible potential to result in lethal and sub-lethal impacts to a certain portion of fish larvae in affected areas, depending on concentration and duration of exposure and the inherent toxicity of the hydrocarbon. 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 recent 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 this 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). Any impacts to spawning and nursery areas are expected to be slight and short term, as would flow on effects to adult fish stocks into which larvae are recruited.
Coral Reef Habitat
The quantitative spill risk assessment indicates there would be a 1% probability for entrained hydrocarbons above threshold concentrations (>100 ppb) to contact Poivre Reef (refer to **Table 7-7**), and therefore exposure to subtidal coral reef habitat. Exposure to entrained hydrocarbons has the potential to result in lethal or sub-lethal toxic effects to corals and other sensitive sessile benthos within the upper water column, including subtidal corals. Mortality in a number of coral species is possible and this would result in the reduction of coral cover and change in the composition of coral communities. Sub-lethal effects to corals may include polyp retraction, changes in feeding, bleaching (loss of zooxanthellae), increased mucous production resulting in reduced growth rates and impaired reproduction (Negri and Heyward 2000). In the unlikely event of a marine diesel spill occurring at the time of coral spawning at potentially affected coral locations or in the general peak period of biological productivity, there is potential for a reduction in successful fertilization 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 sub-lethal impacts and in some cases mortality. This is with particular reference to the early life-stages of coral reef animals (reef attached fishes and reef invertebrates), which can be relatively sensitive to hydrocarbon exposure. Coral reef fish are site attached, have small home ranges and as reef residents they are at higher risk from hydrocarbon exposure than non-resident, more wide-ranging fish species. The exact impact on resident coral communities will be entirely dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. The modelling indicates that locations exposed to entrained hydrocarbons at or above the threshold concentration of 100 ppb is extremely unlikely (1%). Dissolved hydrocarbons above threshold concentrations (>100 ppb) were not predicted by the modelling to occur at any sensitive receptor locations. Therefore, reefs located in the EMBA are expected to have very limited contact with entrained hydrocarbons and no contact with dissolved hydrocarbons. If coral habitats within the EMBA are exposed to hydrocarbons, coral community live cover, structure and composition is predicted to reduce, manifested by loss of corals and associated sessile biota. Recovery of these impacted areas

Summary of Potential Impacts to Environmental Values(s)
relies on coral larvae from neighbouring coral communities that have either not been affected or only partially impacted.
Key Ecological Features
KEFs potentially impacted by a marine diesel spill from a vessel collision event are: • Ancient coastline at 125 m depth contour • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula • Commonwealth waters adjacent to Ningaloo Reef • Continental Slope Demersal Fish communities • Glomar Shoals. These KEFs are largely described to identify the potential for increased biological productivity and, therefore, ecological significance. The consequences of a marine diesel spill from a vessel collision may impact the values of the KEFs affected (for the values of each KEF see **Section 5.7**). Potential impacts include: the contamination of sediments, impacts to benthic fauna and associated impacts to demersal fish populations and reduced biodiversity as described above and below. Most of the KEFs within the EMBA have relatively broad-scale distributions and are unlikely to be significantly impacted.
Summary of potential impacts to water quality
Water quality would be affected due to hydrocarbon contamination which is described in terms of the biological effect concentrations. These are defined by the EMBA descriptions for each of, entrained and dissolved hydrocarbon fates and their predicted extent (refer to **Table 7-7**). Furthermore, water quality is predicted to have minor long-term and/or significant short-term hydrocarbon contamination above background and/or national/international quality standards.
Summary of potential impacts to marine sediment quality
There is a small chance that entrained hydrocarbons (at or above the defined thresholds) may contact submerged shoals and banks in the region (refer to **Table 7-7)**. Such hydrocarbon contact may lead to reduced marine sediment quality by several processes, such as adherence to sediment and deposition on seabed habitat.
Summary of potential impacts to protected areas (including AMPs)
The quantitative spill risk assessment results indicate that the open water environment protected within the State and Commonwealth Marine Parks listed in **Table 7-7** have a slight chance of being affected by entrained and dissolved hydrocarbons, resulting in the actual or perceived contamination of protected areas. Objectives of the Management Plans for the Montebello Islands and Barrow Islands protected areas require considerations to a number of physical, ecological and social values identified in these parks. Impact to the values of these areas is discussed in the relevant sections above (for ecological and physical values) and below (for social 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 socio-economic and cultural values
Fisheries – Commercial
Fish exposure to hydrocarbon can result in 'tainting' of their tissues. Even very low levels of hydrocarbons can impart a taint or 'off' flavour or smell in seafood. Tainting is reversible through the process of depuration which removes hydrocarbons from tissues by metabolic processes, although it is dependent upon the magnitude of the hydrocarbon contamination. Fish have a high capacity to metabolise these hydrocarbons while crustaceans (such as prawns) have a reduced ability (Yender et al., 2002). Seafood safety is a major concern associated with spill incidents. Therefore, actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets long after any actual risk to seafood from a spill has subsided (Yender et al., 2002). A 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 economic impacts to affected commercial fishing operators. The predicted EMBA resulting from a marine diesel spill may impact on the area fished by a number of Commonwealth and State Fisheries (see **Section 5.9.2**). These fisheries generally use a range of gear types and operate from shallow inshore water to water depths up to approximately 200 m, targeting demersal and pelagic finfish species. In the unlikely event of a marine diesel spill, there is the potential for the targeted fish species to be exposed to entrained hydrocarbons in the water column. However, the potential for direct impact would be reduced as target

Summary of Potential Impacts to Environmental Values(s)
species such as snapper are likely to avoid the surface water layer underneath oil slicks. The relatively small spill-affected area and temporary nature of the predicted marine diesel spill would infer that it is unlikely the hydrocarbon concentrations in the upper surface layers would lead to potential exposure of pelagic fish to contamination. Demersal species (such as finfish) have limited mobility and therefore, will not be able to easily move away from a spill. Mortality/sub-lethal effects may impact demersal fish located close to the release location. A loss of marine diesel result from a vessel collision is unlikely to cause significant direct impacts on the target species of Commonwealth or State commercial fisheries within the defined EMBA.
Fisheries – Traditional
No designated traditional fisheries have been identified to occur within the EMBA. It is recognised that indigenous communities may fish in the shallow coastal and nearshore waters however very little impacts to these environments are predicted to occur.
Tourism and Recreational Activities
Limited recreational fishing and tourism activities take place in the offshore waters of the EMBA. A loss of marine diesel from a vessel collision may lead to exclusion of marine nature-based tourist activities, resulting in a loss of revenue for a small number of operators. Recreational fishing activities may experience operational inconvenience as vessels may be required to deviate course to avoid the affected area or seek alternative fishing grounds.
Offshore Oil and Gas Activities
Several oil and gas facilities occur in the EMBA, In the highly unlikely event of a major spill, surface hydrocarbons may affect production from existing petroleum facilities (platforms and FPSOs). For example, facility water intakes for cooling and fire hydrants could be shut off, which could in turn lead to the temporary cessation of production activities. Spill exclusion zones established to manage the spill could also prohibit activity support vessel access as well as tankers approaching facilities on the North West Shelf. 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 about the operation of production facilities in the event of a spill would be based primarily on health and safety considerations.
Commercial Shipping
Low density traffic is expected to occur in the EMBA. A loss of marine diesel from a vessel collision may lead to exclusion of commercial shipping, resulting in operational inconvenience as vessels may be required to deviate course from intended routes.
Cultural Heritage
A search of the Australian National Shipwreck Database (**Section 5.9.1.3**), which records all known Maritime Cultural Heritage (shipwrecks, aircraft, relics and other underwater cultural heritage) in Australian waters, indicated that there are several underwater Cultural Heritage sites within the EMBA. Shipwrecks will be exposed to entrained and dissolved hydrocarbons and 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 all or some of: • large fish species moving away • 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 threshold concentrations (>500 g/m2) are have a very low chance of reaching Barrow or Montebello Islands. At these locations, artefacts, scatter and rock shelter may occur. The Ningaloo Coast World Heritage Place and National Heritage Place is located on the very edge of the EMBA, 350 km SW from the Operational Area. Given this large distance, it is extremely unlikely that a hydrocarbon spill would significantly affect the values of the Ningaloo Coast.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[14]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				

[14] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[14]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
500 m exclusion zone established around offshore support vessel during removal activities.	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.	Controls based on legislative requirements – must be adopted.	Yes **C 1.3**
Comply with Marine Order 30 (prevention of collisions) 2016, including: • adherence to steering and sailing rules including maintaining lookouts (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 visibility, light position/shape appropriate to activity • adherence to navigation noise signals as required.	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirement to reduce the likelihood of interference with other marine users resulting in a collision.	Controls based on legislative requirements – must be adopted	Yes **C 6.1**
Comply with Marine Order 21 (safety and emergency arrangements) 2020, 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 SOLAS • AIS that provides other users with information about	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirement to reduce the likelihood of interference with other marine users resulting in a collision.	Controls based on legislative requirements – must be adopted	Yes **C 6.2**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[14]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
the vessel's identity, type, position, course, speed, navigational status and other safety-related data.				
In the event of a spill, emergency response activities implemented in accordance with the OPEP (**Table 8-4**).	F: Yes CS: Costs associated with implementing response strategies, vary dependant on nature and scale of spill event. Standard practice.	Potentially reduces consequence by implementing response to reduce impacts to the marine environment	Control based on regulatory requirement – must be adopted.	Yes **C 6.3**
Arrangements supporting the activities in the OPEP will be tested to ensure they can be implemented as planned (**Table 8-4**).	F: Yes. CS: Moderate costs associated with exercises. Standard practice.	No change to impact or risk however ensures OPEP can be implemented in the event of a hydrocarbon spill thereby potentially reducing the consequence.	Control based on regulatory requirement – must be adopted.	Yes **C 6.4**
Good Practice				
Notify AHO of activities and movements no less than four weeks before the scheduled activity commencement date.	F: Yes CS: Minimal cost. Standard practice.	Notification to AHO will enable them to generate navigation warnings (Maritime Safety Information Notifications (MSIN)) and NTM [including AUSCOAST warnings where relevant)]).	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.1**
Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities and movements 24-48 hours before the scheduled activity commencement date.	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.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.2**
Notify relevant commercial fisheries licence holders of activities and movements no less than four weeks before the scheduled activity commencement date.	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.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.3**
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

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[14]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
Risk Based Analysis				
A quantitative spill risk assessment was undertaken (see detail above).				
ALARP Statement				
On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the communications protocol that will be in place between the project vessels (i.e. Decision Type A), Woodside considers the adopted controls appropriate to manage the impacts and risks of an unplanned loss of hydrocarbon resulting from vessel collision. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement
The impact assessment has determined that an accidental hydrocarbon release as a result of a vessel collision represents a moderate current risk rating and may result in minor, short-term impact (1-2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes and communities. 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 (refer to **Section 7.8**). 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. On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability outlined in **Section 2.7**, this is considered an acceptable level of risk.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 1 Marine users are aware of the Petroleum Activities Program	**C 1.1** Refer to **Section 7.6.1**	**PS 1.1** Refer to **Section 7.6.1**	**MC 1.1.1** Refer to **Section 7.6.1**
	C 1.2 Refer to **Section 7.6.1**	**PS 1.2** Refer to **Section 7.6.1**	**MC 1.2.1** Refer to **Section 7.6.1**
	C 1.3 Refer to **Section 7.6.1**	**PS 1.3** Refer to **Section 7.6.1**	**MC 1.3.1** Refer to **Section 7.6.1**
EPO 2 Prevent adverse interactions between vessels and other marine users during the Petroleum Activities Program	**C 2.1** Refer to **Section 7.6.1**	**PS 2.1** Refer to **Section 7.6.1**	**MC 2.1.1** Refer to **Section 7.6.1**
EPO 6 No release of hydrocarbons to the marine environment due to a vessel collision during the Petroleum Activities Program.	**C 6.1** 500 m exclusion zone established around offshore support vessel during removal activities.	**PS 6.1** No adverse interactions between vessels	**MC 6.1.1** Records of adverse interactions in 500 m safety exclusion zone with other marine users are recorded.
	C 6.1 Comply with Marine Order 30 (prevention of collisions) 2016, including: • adherence to steering and sailing rules including maintaining lookouts (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 visibility, light position/shape appropriate to activity • adherence to navigation noise signals as required.	**PS 6.1** Project vessels compliant with Marine Order 30 (prevention of collisions) 2016 (which requires vessels to be visible at all times).	**MC 6.1.1** Marine Assurance inspection records demonstrate compliance with standard maritime safety procedures (Marine Orders 21 and 30).

	C 6.2 Comply with Marine Order 21 (safety and emergency arrangements) 2020, 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 SOLAS • AIS that provides other users with information about the vessel's identity, type, position, course, speed, navigational status and other safety-related data.	**PS 6.2** Project vessels compliant with Marine Order 21 (safety of navigation and emergency procedures) 2016.	
	C 6.3 In the event of a spill emergency response activities implemented in accordance with the OPEP (**Table 8-4**).	**PS 6.3** In the event of a spill the OPEP requirements are implemented.	**MC 6.3.1** Completed incident documentation shows requirements of were implemented in the event of a spill.
	C 6.4 Arrangements supporting the activities in the OPEP will be tested to ensure they can be implemented as planned (**Table 8-4**).	**PS 6.4.1** Exercises/tests will be conducted in alignment with the frequency identified in **Table 8-4**.	**MC 6.4.1** Testing of arrangement records confirm that emergency response capability has been maintained.
		PS 6.4.2 Woodside's procedure demonstrates a minimum level of trained personnel, for core roles in the OPEP, are maintained.	**MC 6.4.2** Emergency Management dashboard confirms that minimum level of personnel trained for core OPEP roles are available.
Detailed preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are provided in **Appendix D**.			

7.7.3 Unplanned Discharge: Deck Spills

Context		
Project Vessels – **Section 4.6.3**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Accidental discharge of hydrocarbons/ chemicals from Project vessel deck activities and equipment (e.g. cranes and winches) within the Operational Area			x			x		A	E	2	L	LCS GP	Broadly Acceptable	EPO 7

Description of Source of Risk

Deck spills can result from spills from stored hydrocarbons/chemicals or equipment. Project vessels typically store hydrocarbon/chemicals in various volumes. 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).

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.

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 guideline is used to demonstrate that the potential impacts of the chemicals that may be released are acceptable and ALARP and meet Woodside's expectation for environmental performance (**Section 4.11**).

Impact Assessment

Potential Impacts to Environmental Value(s)

No significant impacts from the accidental discharges described are anticipated in the offshore/open water locations of the Operational Area, because of the minor quantities involved (<10 L), the limited duration of vessel activities during the Petroleum Activities Program, and high level of dilution into the open water marine environment of the Operational Area. The biological consequences of such a small volume spill on identified open water sensitive receptors relate to a minor potential for toxicity impacts to plankton and fish populations (surface and water column biota) and localised reduction in water quality within a small spill affected area. No impacts are predicted to benthic habitat communities in the Operational Area.

Summary of Potential Impacts to Environmental Value(s)

Given the adopted controls, it is considered that minor hydrocarbon/harmful chemical spills to the marine environment will not result in a potential impact to water quality greater than localised contamination above background levels, quality standards or known effect concentrations, and will not result in a potential impact greater than slight and short term (i.e. Environmental Impact – F).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[15]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
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 7.1**
Good Practice				
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.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 7.2**
Maintain and locate spill kits in close proximity to hydrocarbon storage areas and deck areas for use to contain and recover deck spills.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of a deck spill from entering the marine environment. The consequence is unchanged.	Benefits outweigh cost/sacrifice.	Yes **C 7.3**
Professional Judgement – Eliminate				
None identified.				
Professional Judgement – Substitute				
None identified				
Professional Judgement – Engineered Solution				
Below-deck storage of all hydrocarbons and chemicals.	F: Not feasible. 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 the vessel.	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 activities to occur.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No

[15] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[15]***	***Benefit/Reduction in Impact***	***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 (i.e. Decision Type A), Woodside considers the adopted controls appropriate to manage the impacts and risks of the potential unplanned accidental deck spills described above. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement The risk assessment has determined that an unplanned minor discharge of hydrocarbons/chemicals as a result of minor deck spills represents a low current risk rating that is unlikely to result in potential impact greater than localised and temporary 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 consistent with the most relevant regulatory guidelines and good oil-field practice/industry best practice. The potential impacts and risks are considered acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks of minor unplanned deck spills to a level that is broadly acceptable.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 7 No unplanned spills to the marine environment from deck activities greater than a consequence level of F[16] during the Petroleum Activities Program.	**C 7.1** Marine Order 91 (marine pollution prevention – oil) 2014, requires SOPEP/SMPEP (as appropriate to vessel class).	**PS 7.1** Appropriate initial responses prearranged and drilled in case of a hydrocarbon spill, as appropriate to vessel class.	**MC 7.1.1** Marine Assurance inspection records demonstrate compliance with Marine Order 91.
	C 7.2 Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/ moved temporarily.	**PS 7.2** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 7.2.1** Records confirms all liquid chemicals and fuel are stored in bunded/ secondarily contained areas when not being handled/moved temporarily.
	C 7.3 Maintain and locate spill kits in close proximity to hydrocarbon storage areas and deck areas for use to contain and recover deck spills.	**PS 7.3** Spill kits to be available for use to clean up deck spills.	**MC 7.3.1** Records confirms spill kits are present, maintained and suitably stocked.

[16] Defined as 'No lasting effect (less than one month); localised impact not significant to environmental receptors'.

7.7.4 Unplanned Discharge: Loss of Solid Hazardous and Non-Hazardous Wastes (including Dropped Objects)

Context		
Activity Components - **Section 4**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Accidental loss of hazardous or non-hazardous wastes (including dropped objects) to the marine environment (excludes sewage, grey water, putrescible waste and bilge water).			X		X	X		A	F	2	L	LCS GP	Broadly Acceptable	EPO 8

Description of Source of Impact

Solid Wastes

The 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. Wastes on-board are managed in accordance with the on-board waste management plan. Some wastes may be incinerated. Based on industry experience, waste items lost overboard are typically wind-blown rubbish such as container lids, cardboard etc. Such losses typically have occurred during back loading activities, periods of adverse weather and incorrect waste storage.

Dropped Objects

There is the potential for objects to be dropped overboard from the 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).

For the Petroleum Activities Program, the largest dropped object would be the wellhead itself. The wellhead, including the TGB and PGB, once removed will be approximately 4.5 m tall with a radius of approximately 1 m.

Impact Assessment

Potential Impacts to Environmental Values

The potential impacts of solid wastes accidentally discharged to the marine environment include direct pollution and contamination of the environment and secondary impacts relating to potential contact of marine fauna with wastes, resulting in entanglement or ingestion and leading to injury and death of individual animals. Several migratory and threatened species were identified as occurring within the Operational Area, including cetaceans, marine turtles and whale sharks. However, these species are expected to be transient as there are no known key aggregation areas. However, the temporary or permanent loss of waste materials into the marine environment is highly unlikely to have a significant environmental impact, based on the types, size and frequency of wastes that could occur during the limited time the vessels will be in the Operational Area and the transient nature of the species present. Given this, impacts will have no lasting effect on any species or water quality.

In the unlikely event of loss of an object being dropped into the marine environment, potential environmental effects would be limited to localised 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 localised but would also be long-term. The benthic communities associated with the Operational Area are of low sensitivity and are broadly represented throughout the broader region (**Section 5.5**). Significant impacts to these communities are not expected and no lasting effects are anticipated.

The Operational Area overlaps the Ancient Coastline at 125m depth contour and therefore, dropped objects may directly affect a very small, localised area of the KEF. Significant impacts to the KEF are not expected and no lasting effects are anticipated.

Summary of Potential Impacts to Environmental Values(s)

Given the adopted controls, it is considered that the accidental discharge of solid waste or dropped object described will result in localised impacts to environmental receptors with no significant impact anticipated, and with no lasting effect (i.e. Environmental Impact – F).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[17]***	***Benefit/Reduction in Impact***	***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				
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.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of an unplanned release. The consequence is unchanged.	Benefit outweighs cost sacrifice.	Yes **C 8.2**
Lost waste/dropped objects will be recovered, where safe and practicable. Where safe and practicable for this activity, will consider: • risk to personnel to retrieve object • whether the location of the object is in	F: Yes, however it may not always be practicable. Assessed on a case by case situation. CS: Minimal cost. Standard practice.	No reduction in likelihood, as this is an unplanned event. Since the equipment may be recovered, a reduction in consequence is possible.	Benefit outweighs cost sacrifice.	Yes **C 8.3**

[17] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[17]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
recoverable water depths • object's proximity to subsea infrastructure • ability to recover the object (i.e. nature of object, lifting equipment and suitable weather).				
Professional Judgement – Eliminate				
None identified.				
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
ALARP Statement On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e. Decision Type A), Woodside considers the adopted controls appropriate to manage the impacts and risks of accidental discharges of waste. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement The 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 above localised slight, short term localised impact 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). 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 8 No unplanned releases of solid hazardous or non-hazardous waste to the marine environment greater than a consequence level of F[18] during the Petroleum Activities Program.	**C 8.1** 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.	**PS 8.1** Project vessels compliant with Marine Order 95.	**MC 8.1.1** Records demonstrate project vessels are compliant with Marine Order 95.
	C 8.2	**PS 8.2**	**MC 8.2.1**

[18] *Defined as 'No lasting effect (less than one month); localised impact not significant to environmental receptors'.*

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	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.	Waste will be managed in accordance with the project vessel waste arrangements.	Records demonstrate compliance against project vessel waste arrangements.
	C 8.3 Lost waste/dropped objects will be recovered, where safe and practicable. 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 and suitable weather).	**PS 8.3** Waste dropped to the marine environment will be recovered where safe and practicable to do so.	**MC 8.3.1** Records detail the recovery attempt consideration and status of any waste lost to the marine environment.

7.7.5 Physical Presence: Vessel Collision with Marine Fauna

Context		
Project Vessels – **Section 4.6.3**	Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Accidental collision between project vessels and threatened and/or migratory marine fauna within the Operational Area.						x		A	F	1	L	LCS	Broadly Acceptable	EPO 9

Description of Source of Risk

The project vessels operating in and around the Operational Area may present a potential hazard to cetaceans and other protected marine fauna. Vessel movements can result in collisions between the vessel (hull and propellers) and marine fauna, potentially resulting in superficial injury, serious injury that may affect life functions (e.g. movement and reproduction) and mortality. The 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.

Project vessels would typically be stationary or moving at low speeds when supporting the Petroleum Activities Program; general support vessels typically transit to and from the Operational Areas between two and four trips per week (e.g. to port).

Impact Assessment

Potential Impacts to Environmental Values

Vessel disturbance is a key threat to a number of migratory and threatened species identified as potentially occurring within Operational Area, including cetaceans, marine turtles and whale sharks. However, the only BIA overlapping the Operational Area is the foraging BIA for whale sharks. Relevant conservation actions outlined in these plans are listed in **Section 7.8.**

Cetaceans

Cetaceans are naturally inquisitive marine mammals. The reaction of cetaceans to the approach of a vessel is quite variable. Some species remain motionless when close to a vessel, while others are known to be curious and often approach ships that have stopped or are slow moving, although they generally do not approach and sometimes avoid faster moving ships (Richardson et al. 1995). The Whale and Dolphin Conservation Society (WDCS 2006), indicates that some cetacean species, such as humpback whales, can detect and change course to avoid a vessel.

The likelihood of vessel/whale collision being lethal is influenced by vessel speed—the greater the speed at impact, the greater the risk of mortality (Jensen and Silber, 2004; Laist et al., 2001). Vanderlaan and Taggart (2007) found that the chance of lethal injury to a large whale as a result of a vessel strike increases from about 20% at 8.6 knots to 80% at 15 knots. Project vessels within the Operational Area are likely to be travelling <8 knots, therefore, the chance of a vessel collision with protected species resulting in a lethal outcome is considered unlikely, as fauna can move away from project vessels.

Collisions between vessels and marine mammals occur more frequently in areas where high vessel traffic and important habitat coincide (WDCS 2006). Given the absence of BIAs or other aggregations, the duration of activities within the Operational Area and the slow speeds at which project vessels operate, collisions with cetaceans are considered highly unlikely.

Marine Turtles

Marine turtles are at potential risk from vessel strike. Hazel and Gyuris (2006) reviewed vessel strike data from 1999-2002 on the Queensland east coast and found that during that period at least 65 turtles were killed annually as a result of collisions with vessels. Green turtles, followed by loggerhead turtles comprised the majority of vessel related records, and 72% of cases were adult or sub-adult turtles (Hazel and Gyuris 2006). In Australian waters, all species of marine turtle have been involved in vessel strikes (DoEE 2016).

The effect of vessel speed and turtle flee response can be significant. A study by Hazel et al. (2007) found that 60% of green turtles fled from vessels travelling at 2.2 knots (4 km/h) while only 4% fled from vessels travelling at 10.2 knots (19 km/h). When fleeing, 75% of turtles moved away from the vessel's track, 8% swam along the vessel track and 18% crossed in front of the vessel. The study concluded that most turtles would be unlikely to avoid vessels travelling at speeds greater than around 2.2 knots (Hazel et al. 2007, DoEE 2017).

The Operational Area does not overlap any BIA or critical habitat areas for marine turtles (see **Section 5.6.2**). Due to the absence of marine turtle aggregations, the Operational Area is unlikely to represent important habitat for marine turtles. The occurrence of all species of marine reptiles within the Operational Area is expected to be limited to infrequent occurrences of transitory individuals. Given the duration of activities within the Operational Area and the slow speeds at which project vessels operate, collisions or entanglement with transiting marine turtles are considered highly unlikely.

Whale Sharks

Whale sharks which have been shown to spend approximately 25% of their time less than 2 m from the surface and greater than 40% in the upper 15 m of the water column (Wilson et al., 2006; Gleiss et al., 2013) making them vulnerable to vessel strike. Individuals are most at risk from vessel strikes when feeding at the surface or in shallow waters (where there is limited option to dive). Given that the Operational Area overlaps the foraging BIA for this species, there may be an increased risk of interaction during between August and December. However, considering the duration of the activities, and the slow speed of vessels during the activity, the risk is considered low.

Summary of Potential Impacts to Environmental Value(s)

Given the adopted controls, it is considered that if a collision or entanglement were to occur, it will not result in a potential impact greater than a localised impact to environmental receptors with no lasting effect to marine fauna populations (i.e. Environmental Impact – F).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[19]***	***Benefit/Reduction in Impact***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[20]: • 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	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 9.1**

[19] Qualitative measure

[20] For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability; e.g. 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)[19]***	***Benefit/Reduction in Impact***	***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 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				
No additional controls identified.				
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				
Management of vessel noise by varying the timing of the Petroleum Activities Program to avoid whale shark migration periods (April – August).	F: Yes. Avoidance of the migration period is technically feasible, although not considered to be reasonably practicable. CS: Significant cost and schedule delays in contracting vessel for a specific timeframe.	Negligible reduction in consequence given the duration and nature of the activity and receiving environment	Grossly disproportionate. Implementation of the control requires considerable cost sacrifice for minimal environmental benefit.	No
The use of dedicated MFOs on general support vessel(s) 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. Vessel bridge crews already maintain a constant watch during operations, and crew complete specific cetacean observation training. CS: Additional cost of MFOs considered unnecessary.	Given general support vessel bridge crews already maintain a constant watch during operations, additional MFOs would not significantly further reduce the risk.	Grossly disproportionate. Implementation of the control requires considerable cost sacrifice for minimal environmental benefit.	No
Professional Judgement – Engineered Solution				
None identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[19]***	***Benefit/Reduction in Impact***	***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 (i.e. Decision Type A), Woodside considers the adopted controls appropriate to manage the impacts and risks of potential vessel collision/entanglement with protected marine fauna. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement The impact assessment has determined that, given the adopted controls, vessel collision with marine fauna represents a low risk rating, with localised impacts and no lasting effect to marine fauna populations. 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 Act Regulations 2000. The residual risk of vessel collision with marine fauna is not inconsistent with the relevant objectives and actions of any applicable recovery plans or threat abatement plans (refer to **Section 7.8**), based on the adopted controls. Regard has been given to relevant conservation advice during the assessment of potential risks. 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 9 No vessel strikes with marine fauna (whales, whale sharks and turtles) during the Petroleum Activities Program.	**C 9.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[21]: • 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. • Vessels will not travel faster than eight knots within 250 m of a	**PS 9.1** 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 and application of these regulations to whale sharks and marine turtles.	**MC 9.1.1** Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans and application of these regulations to whale sharks and marine turtles.
		PS 9.2 All vessel strike incidents with cetaceans, whale sharks and marine turtles 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 9.1.2** Records demonstrate reporting cetacean, whale sharks and marine turtles ship strike incidents to the National Ship Strike Database.

[21]For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability; e.g. 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***
	whale shark and not allow the vessel to approach closer than 30 m of a whale shark.		

7.7.6 Physical Presence: Introduction and Establishment of Invasive Marine Species

Context		
Project Vessels – **Section 4.6.3** Helicopters – **Section 4.9**	Physical Environment – **Section 5.4** Biological Environment – **Section 5**	Stakeholder Consultation – **Section 6**

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socioeconomic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcomes
Introduction and establishment of invasive marine species (IMS)					X	X	X	A	E	0	L	LCS GP	Broadly Acceptable	EPO 10

Description of Source of Risk

During the Petroleum Activities Program, vessels have the potential to introduce IMS to the Operational Area.

Project vessels will be transiting to and from the Operational Area, potentially including traffic mobilising from international waters. There is the potential for project vessels to transfer IMS from either international waters, Australian waters or coastal waters into the Operational Area.

All vessels are subject to some level of marine fouling. Organisms attach to the vessel hull, particularly 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.). Commercial vessels typically maintain anti-fouling coatings to reduce the build-up of fouling organisms. Organisms can also be drawn into ballast tanks during onboarding of ballast water required to maintain safe operating conditions.

Project vessels have the potential to introduce IMS to the Operational Area through marine biofouling (containing IMS) on vessels, as well as within high-risk ballast water exchange. 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 (Williamson and Fitter, 1996; Paulay et al., 2002; Geiling, 2014).

While project vessels have the potential to introduce IMS into the Operational Areas, the deep offshore open waters of the Operational Area (which are >120 m deep) are not conducive to the settlement and establishment of IMS. Furthermore, the Operational Area is away from shorelines and/or critical habitat. The likelihood of IMS being introduced and establishing viable populations within the Operational Areas or immediate surrounds is considered not credible.

Summary of Potential Impacts to Environmental Value(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 an IMS translocation. The results of this assessment are presented in **Table 7-8.**

As a result of this assessment, Woodside has assessed the potential consequence and likelihood after implementing the identified controls. This assessment concluded that the highest potential consequence is an 'E' and the likelihood is 'Remote' (0), resulting in an overall 'Low' risk.

Table 7-8 Evaluation of risks and impacts from marine pest translocation

IMS Introduction Location	Credibility of Introduction	Consequence of Introduction	Likelihood
Introduced to Operational Areas and establishment on the seafloor or subsea structures.	***Not Credible*** The Operational Areas are deep offshore open waters away from shorelines and/or critical habitat therefore they are not conducive to the settlement and establishment of IMS.		
Introduced to Operational Areas and establishment on a project vessel.	***Credible*** There is potential for the transfer of marine pests between project vessels within the Operational Areas.	***Environment – Not credible*** The translocation of IMS from a colonised project vessel to another vessel and then to the environment is not credible. This is because the Operational Areas are in deep open waters away from shorelines and/or critical habitat. Furthermore, the translocation to shallower environments via natural dispersion from a project vessel is not considered credible, given the distances of the Operational Areas from nearshore environments (i.e. greater than 50 m water depth). On this basis there is no credible environmental risk. **Reputation – D** If IMS were to establish on a project vessel, from another colonised vessel this could potentially impact the vessel operationally through the fouling of intakes, and potentially cause the infected vessels to be quarantined and requiring costly cleaning. Such introduction would be expected to have minor impact to Woodside's reputation, particularly with Woodside's contractors, and may impact future proposals. 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 activity, and interactions limited to 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 Operational Areas.	***Not Credible*** This risk is considered so remote that it is not credible for the purposes of the activity. As described above the transfer of IMS between project vessels was already considered remote, given the offshore open ocean environment. 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 Operational Areas to shore. In the event it was to survive this trip, it would then need conditions conducive to establishing a viable population in the nearshore waters that the infected vessel travels to.

Demonstration of ALARP

Control Considered	*Control Feasibility (F) and Cost/Sacrifice (CS [22]*	*Benefit/Reduction in Impact*	*Proportionality*	*Control Adopted*
Legislation, Codes and Standards				
Project vessels will manage their ballast water using one of the approved ballast water management options, as outlined in the Australian Ballast Water Management Requirements.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of transferring marine pests between project 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 10.1**
Good Practice				
Woodside's IMS risk assessment process[23] will be applied to the project vessels and relevant immersible equipment undertaking the Petroleum Activities Program. Assessment will consider these risk factors: For vessels: • vessel type • recent IMS inspection and cleaning history, including for internal niches • out-of-water period before mobilisation • age and suitability of antifouling coating at mobilisation date • internal treatment systems and history • origin and proposed area of operation • number of stationary/slow speed periods >7 days	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 Operational Area is reduced. No change in consequence would occur.	Benefits outweigh cost/sacrifice.	Yes **C 10.2**

[22] Qualitative measure

[23] 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).

• region of stationary or slow periods • type of activity – contact with seafloor. 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				
Do not discharge ballast water during the Petroleum Activities Program.	F: No. Ballast water discharges are critical for maintain vessel stability. Given the nature of the Petroleum Activities Program, the use of ballast (including the potential discharge of ballast water) is considered to be a safety-critical requirement. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Eliminate use of vessels	F. No. Given that vessels must be used to complete the Petroleum Activities Program, 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 potential pose a significant risk in terms of the time and duration of sourcing a vessel, as well as the ability of the local vessel to perform the tasks. While the project will attempt to source support vessels locally, it is not always possible. Availability cannot always be guaranteed. There are limited project vessels based in Australian waters and sourcing Australian-based vessels only will cause increases in cost due to pressures of vessel availability.	Sourcing vessels from within Australia will reduce the likelihood of IMS introduction from outside Australian waters; however, it does not reduce the likelihood of introducing species native to Australia but alien to the Operational Area. It also does not prevent the translocation of IMS that have established elsewhere in Australia. Therefore, the consequence is unchanged.	Disproportionate. Sourcing vessels from Australian waters may result in a slight reduction in the likelihood of introducing IMS to the Operational Area, however it does not completely eliminate the risk. Furthermore, the potential cost of implementing this control could be high, given the potential supply issues associated with only locally sourcing vessels.	No

	CS: Significant cost and schedule impacts due to supply restrictions.			
IMS inspection of all vessels	F: Yes CS. Significant cost and schedule impacts. In addition, Woodside's IMS risk assessment process is seen to be more cost-effective as this control allows Woodside to manage the introduction of IMS through biofouling, while targeting efforts and resources to the areas of greatest concern.	Inspection of all vessels for IMS would reduce the likelihood of IMS being introduced to the Operational Area. 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 that are proposed to be implemented achieve ALARP position.	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 (i.e. Decision Type A), Woodside considers the adopted controls appropriate to manage the risks and consequences of IMS introduction. As no reasonable additional/alternative controls were identified that would further reduce the risks and consequences without disproportionate sacrifice, the risks and consequences are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement The impact assessment has determined that, given the adopted controls, introduction of IMS to the Operational Area through ballast water or biofouling on vessels represents a low residual risk that has a remote likelihood of resulting in a potential impact greater than slight, short-term impact (less than one year) to a small proportion of the benthic community. 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 introducing IMS to the Operational Area to a level that is broadly acceptable.

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 10 No introduction and establishment of invasive marine species into the Operational Area as a result of the Petroleum Activities Program.	**C 10.1** Project vessels will manage their ballast water using one of the approved ballast water management options, as outlined in the Australian Ballast Water Management Requirements.	**PS 10.1** Project vessels will manage ballast water in accordance with Australian Ballast Water Management Requirements.	**MC 10.1.1** Ballast Water Records System maintained by vessels which verifies compliance against Australian Ballast Water Management Requirements.
	C 10.2 Woodside's IMS risk assessment process[24] will be applied to project vessels and relevant immersible equipment	**PS 10.2** Before entering the Operational Area, project vessels and relevant immersible equipment are	**MC 10.2.1** Records of IMS risk assessments maintained for all project vessels and relevant immersible equipment entering the

[24] 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).

Environmental Performance Outcomes, Standards and Measurement Criteria			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	undertaking the Petroleum Activities Program. Assessment will consider these risk factors: For vessels: • vessel type • recent IMS inspection and cleaning history, including for internal niches • out-of-water period before mobilisation • age and suitability of antifouling coating at mobilisation date • internal treatment systems and history • origin and proposed area of operation • number of stationary/slow speed periods >7 days • region of stationary or slow periods • type of activity – contact with seafloor. For immersible equipment: • region of deployment since last thorough clean, particularly coastal locations • duration of deployments • 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.	determined to be low risk[25] of introducing IMS of concern, and maintain this low risk status to mobilisation.	operational area to undertake the Petroleum Activities Program.
		PS 10.3 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 IMS training or by qualified and experienced IMS inspector.	**MC 10.3.1** Records confirm that the IMS risk assessments undertaken by an Environment Adviser or IMS inspector (as relevant).

[25] Low risk of introducing IMS of concern is defined as either no additional management measures required or, management measures have been applied to reduce the risk.

7.8 Recovery Plan and Threat Abatement Plan Assessment

As described in **Section 1.9.1.3.1**, NOPSEMA will not accept an EP that is 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 (**Section 2.8**).

For the purposes of this assessment, the relevant Part 13 statutory instruments (recovery plans and threat abatement plans) are:

- Recovery Plan for Marine Turtles in Australia 2017–2027 (Commonwealth of Australia, 2017)
- Conservation Management Plan for the Blue Whale 2015–2025 (Commonwealth of Australia, 2015a)
- Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) 2014 (Commonwealth of Australia, 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 7-9 lists the objectives and (where relevant) the action areas of these plans, and also describes whether these objectives/action areas are applicable to government, the Titleholder, and/or the Petroleum Activities Program. For those objectives/action areas applicable to the Petroleum Activities Program, the relevant actions of each plan have been identified, and an evaluation has been conducted as to whether impacts and risks resulting from the activity are not inconsistent with that action. The results of this assessment against relevant actions are presented in **Table 7-10** to **Table 7-14**.

Table 7-9 Identification of applicability of recovery plan and threat abatement plan objectives and action areas

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
Marine Turtle Recovery Plan			
Long-term Recovery Objective: Minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so they can be removed from the EPBC Act threatened species list	Y	Y	Y
Interim Recovery Objectives			
Current levels of legal and management protection for marine turtle species are maintained or improved, both domestically and throughout the migratory range of Australia's marine turtles	Y		
The management of marine turtles is supported	Y		
Anthropogenic threats are demonstrably minimised	Y	Y	Y
Trends in nesting numbers at index beaches and population demographics at important foraging grounds are described	Y	Y	
Action Areas			
A. Assessing and addressing threats			
A1. Maintain and improve efficacy of legal and management protection	Y		
A2. Adaptatively manage turtle stocks to reduce risk and build resilience to climate change and variability	Y		
A3. Reduce the impacts of marine debris	Y	Y	Y
A4. Minimise chemical and terrestrial discharge	Y	Y	Y
A5. Address international take within and outside Australia's jurisdiction	Y		
A6. Reduce impacts from terrestrial predation	Y		
A7. Reduce international and domestic fisheries bycatch	Y		
A8. Minimise light pollution	Y	Y	Y
A9. Address the impacts of coastal development/infrastructure and dredging and trawling	Y	Y	
A10. Maintain and improve sustainable Indigenous management of marine turtles	Y		
B. Enabling and measuring recovery			

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
B1. Determine trends in index beaches	Y	Y	Y
B2. Understand population demographics at key foraging grounds	Y		
B3. Address information gaps to better facilitate the recovery of marine turtle stocks	Y	Y	Y
Blue Whale Conservation Management Plan			
Long-term recovery objective: Minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act threatened species list	Y	Y	Y
Interim Recovery Objectives			
The conservation status of blue whale populations is assessed using efficient and robust methodology	Y		
The spatial and temporal distribution, identification of biologically important areas, and population structure of blue whales in Australian waters is described	Y	Y	Y
Current levels of legal and management protection for blue whales are maintained or improved and an appropriate adaptive management regime is in place	Y		
Anthropogenic threats are demonstrably minimised	Y	Y	Y
Action Areas			
A. Assessing and addressing threats			
A.1: Maintain and improve existing legal and management protection	Y		
A.2: Assessing and addressing anthropogenic noise	Y	Y	Y
A.3: Understanding impacts of climate variability and change	Y		
A.4: Minimising vessel collisions	Y	Y	Y
B. Enabling and Measuring Recovery			
B.1: Measuring and monitoring population recovery	Y		
B.2: Investigating population structure	Y		
B.3: Describing spatial and temporal distribution and defining biologically important habitat	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
Grey Nurse Shark Recovery Plan			
Overarching Objective			
To assist the recovery of the grey nurse shark in the wild, throughout its range in Australian waters, with a view to: improving the population status, leading to future removal of the grey nurse shark from the threatened species list of the EPBC Act ensuring that anthropogenic activities do not hinder the recovery of the grey nurse shark in the near future, or impact on the conservation status of the species in the future	Y	Y	Y
Specific Objectives			
Develop and apply quantitative monitoring of the population status (distribution and abundance) and potential recovery of the grey nurse shark in Australian waters	Y		
Quantify and reduce the impact of commercial fishing on the grey nurse shark through incidental (accidental and/or illegal) take, throughout its range	Y		
Quantify and reduce the impact of recreational fishing on the grey nurse shark through incidental (accidental and/or illegal) take, throughout its range	Y		
Where practicable, minimise the impact of shark control activities on the grey nurse shark	Y		
Investigate and manage the impact of ecotourism on the grey nurse shark	Y		
Manage the impact of aquarium collection on the grey nurse shark	Y		
Improve understanding of the threat of pollution and disease to the grey nurse shark	Y	Y	Y
Continue to identify and protect habitat critical to the survival of the grey nurse shark and reduce the impact of threatening processes within these areas	Y	Y	
Continue to develop and implement research programs to support the conservation of the grey nurse shark	Y	Y	
Promote community education and awareness in relation to grey nurse shark conservation and management	Y		
Sawfish and River Sharks Recovery Plan			
Primary Objective			
To assist the recovery of sawfish and river sharks in Australian waters with a view to:	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
improving the population status leading to the removal of the sawfish and river shark species from the threatened species list of the EPBC Act ensuring that anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future			
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	
Understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations	Y	Y	Y
Remove existing marine debris	Y		

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
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 7-10 Assessment against relevant actions of the Marine Turtle Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Marine Turtle Recovery Plan	**Action Area A3**: Reduce the impacts from marine debris	**Action**: Support the implementation of the Marine Debris Threat Abatement Plan (TAP) Priority actions at stock level: • G-NWS – Understand the threat posed to this stock by marine debris • LH-WA – Determine the extent to which marine debris is impacting loggerhead turtles. • F-Pil – no relevant actions	Refer **Section 7.7.4** **Not inconsistent assessment**: The assessment of accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to marine turtles.	**EPO 8** **C 8.1, 8.2, 8.3. 8.4** **PS 8.1, 8.2, 8.3. 8.4**
	Action Area A4: Minimise chemical and terrestrial discharge	**Action**: Ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to 'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs Priority actions at stock level: • G-NWS,– Ensure that spill risk strategies and response programs include management for turtles and their habitats • LH-WA & F-Pil– Ensure that spill risk strategies and response programs include management for turtles and their habitats, particularly in reference to slow to recover habitats, e.g. seagrass meadows or corals.	Refer **Sections 7.7.2** and **7.7.3** **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 8.9.** Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are present in **Appendix D**
	Action Area A8: Minimise light pollution	**Action**: Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats Priority actions at stock level: • G-NWS – as above • LH-WA – no relevant actions • F-Pil – Manage artificial light from onshore and offshore sources to ensure biologically	Refer **Section 7.6.6.** **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 will not result in impacts to nesting marine turtles or emerging hatchlings at nesting beaches. Transient individuals occurring within the Operational Area are not undertaking behaviours guided by	N/A

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
		important behaviours of nesting adults and emerging/dispersing hatchlings can continue	light cues reducing the potential impacts to these individuals.	
	Action Area B1: Determine trends at index beaches	**Action**: Maintain or establish long-term monitoring programs at index beaches to collect standardised data critical for determining stock trends, including data on hatchling production Priority actions at stock level: • G-NWS - Continue long-term monitoring of index beaches • LH-WA – Continue long-term monitoring of nesting and foraging populations • F-Pil – no relevant actions.	**Not inconsistent assessment**: Woodside contributes to Action Area B1 via its support of the Ningaloo Turtle Program[26].	N/A
	Action Area B3: Address information gaps to better facilitate the recovery of marine turtle stocks	**Action**: Understand the impacts of anthropogenic noise on marine turtle behaviour and biology Priority actions at stock level: • G-NWS – Given this is a relatively accessible stock that is likely to be exposed to anthropogenic noise – Investigate the impacts of anthropogenic noise on turtle behaviour and biology and extrapolate findings from the North West Shelf stock to other stocks • LH-WA – no relevant actions • F-Pil – no relevant actions.	Refer **Section 7.6.3** **Not inconsistent assessment**: The assessment of acoustic emissions has considered the potential impacts to turtles that may occur within the vicinity of the operational area. Acoustic emissions could cause localised and short-term behavioural disturbance to isolated transient individuals, however, acoustic emissions are not expected to be detectable in aggregating areas such as internesting habitat, considering the distance to the nearest BIA (40 km).	N/A
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.				

[26] http://www.ningalooturtles.org.au/media_reports.html

Table 7-11 Assessment against relevant actions of the Blue Whale Conservation Management Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Blue Whale Conservation Management Plan	**Action Area A.2**: Assessing and addressing anthropogenic noise	**Action 2**: Assessing the effect of anthropogenic noise on blue whale behaviour **Action 3**: Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to use the area without injury, and is not displaced from a foraging area	Refer **Section 7.6.3** **Not inconsistent assessment**: The assessment of acoustic emissions has considered the potential impacts to pygmy blue whales.	N/A
	Action Area A.4: Minimising vessel collisions	**Action 3**: Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented	Refer **Section 7.7.5** **Not inconsistent assessment**: The assessment of vessel collision with marine fauna has considered the potential risks to pygmy blue whales. No aggregations of this species, or migration routes, overlap the Operational Area. Vessel collisions with pygmy blue whales are highly unlikely to occur, given the very slow vessel speeds.	**EPO 9** **C 9.1** **PS 9.1**
	Action Area B.3: Describing spatial and temporal distribution and defining biologically important habitat	**Action 2**: Identify migratory pathways between breeding and feeding grounds **Action 3**: Assess timing and residency within Biologically Important Areas	**Not inconsistent assessment**: Woodside contributes to Action Area B3 via its support of targeted research initiatives (e.g. satellite tracking of pygmy blue whale migratory movements[27]).	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.				

[27] 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

Table 7-12 Assessment against relevant actions of the Sawfish and River Shark Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Sawfish and River Shark Recovery Plan	**Objective 5**: Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species	**Action 5c**: Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks	Refer **Sections 7.7.2** and **7.7.3** **Not inconsistent assessment**: The assessment of accidental release of chemicals / hydrocarbons has considered the potential risks to sawfish.	Refer **Section 8.9.** Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are present in **Appendix D**
	Objective 6: Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species	**Action 6a**: Assess the impacts of marine debris including ghost nets, fishing gear and plastics on sawfish and river shark species	Refer **Section 7.7.4** **Not inconsistent assessment:** The assessment of accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to sawfish.	**EPO 8** **C 8.1, 8.2, 8.3. 8.4** **PS 8.1, 8.2, 8.3. 8.4**
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 7-13: Assessment against relevant actions of the Grey Nurse Shark Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Grey Nurse Shark Recovery Plan	**Objective 7:** Improve understanding of the threat of pollution and disease to the grey nurse shark	**Action 7.1:** Review and assess the potential threat of introduced species, pathogens and pollutants	Refer to **Sections 7.6.5, 7.6.6, 7.7.2, and 7.7.3** **Not inconsistent assessment:** The assessment of accidental release of chemicals / hydrocarbons has considered the potential risks to grey nurse sharks.	Refer **Section 8.9.** 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 7-14 Assessment against relevant actions of the Marine Debris Threat Abatement Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Marine Debris TAP	**Objective 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 7.7.4** **Not inconsistent assessment**: The assessment of accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to vertebrate wildlife.	**EPO 8** **C 8.1, 8.2, 8.3. 8.4** **PS 8.1, 8.2, 8.3. 8.4**
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.				

8. IMPLEMENTATION STRATEGY

8.1 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 1.8**).

8.2 Systems, Practice and Procedures

All operational activities are planned and performed in accordance with relevant legislation and standards, management measures identified in this EP and internal environment standards and procedures (**Section 7**).

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 change during the statutory duration of this EP and is managed through a change register and update process.

8.3 Roles and Responsibilities

Key roles and responsibilities for Woodside and contractor personnel relating to implementing, managing and reviewing this EP are described in **Table 8-1**. Roles and responsibilities for oil spill preparation and response are outlined in **Appendix D** and the *Woodside Oil Pollution Emergency Arrangements (Australia)*.

Table 8-1: Roles and responsibilities

Title (role)	Environmental Responsibilities
Office-based Personnel	
Woodside Delivery Manager	• monitor and manage the Petroleum Activities Program so it is performed as per the relevant standards and commitments in this EP. • notify the Woodside Environment Adviser in a timely manner of any scope changes. • 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 HSE Reporting and Investigation Procedure. • monitor and close out corrective actions identified during environmental monitoring or audits.
Woodside Environmental Adviser	• verify relevant Environmental Approvals for the activities exist before commencing Petroleum Activities Program. • 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 performed as per the requirements of this EP. • liaise with relevant regulatory authorities as required. • assist in preparing required external regulatory reports, in line with environmental approval requirements and Woodside incident reporting procedures. • monitor and close out corrective actions (Campaign Action Register) identified during environmental monitoring or audits. • provide advice to relevant Woodside personnel and contractors to help them understand their environment responsibilities. • liaise with contractors to ensure communication and understanding of environment requirements as outlined in this EP and in line with Woodside's Compass values and management systems.
Woodside Corporate Affairs Adviser	• prepare and implement the Stakeholder Consultation Plan for the Petroleum Activities Program. • report on stakeholder consultation. • continuously liaise and provide notification as required as outlined in the EP.
Woodside Marine Assurance Lead	• conduct relevant audit and inspection to confirm vessels comply with relevant Marine Orders and Woodside Marine Charters Instructions requirements to meet safety, navigation and emergency response requirements.

Title (role)	Environmental Responsibilities
Woodside Corporate Incident Coordination Centre (CICC) Duty Manager	On receiving notification of an incident, the Woodside CICC Duty Manager shall: • establish and take control of the Incident Management Team and establish an appropriate command structure for the incident. • assess the 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 objectives for action. • approve, implement and manage the IAP. • communicate within and beyond the incident management structure. • manage and review safety of responders. • address the broader public safety considerations. • conclude and review activities.
Contractor Project Manager	• confirm activities are performed 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 perform 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 Delivery Manager or Woodside Environmental Advisor.
Offshore support vessel -based Personnel	
Vessels 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 perform the work they have been assigned. • verify SOPEP drills are conducted as per the vessel's schedule. • ensure the vessel Emergency Response Team has been given sufficient training to implement the SOPEP. • ensure any environmental incidents or breaches of relevant EPOs or PSs detailed in this EP are reported immediately to the Woodside Site Representative and Party Chief. • ensure corrective actions for incidents or breaches are developed, communicated to the Woodside Site Representative, and tracked to close-out in a timely manner. Ensure close-out of actions is communicated to the Woodside Site Representative.

Title (role)	Environmental Responsibilities
Party Chief	• understand and manage environmental aspects of the operations per this EP and approval conditions. • provide copies of documents, records, reports and certifications (as requested by Woodside) in a timely manner to assist in compliance reporting. • ensure any environmental incidents or breaches of EPOs or PSs detailed in this EP, are reported immediately to the Woodside Site Representative.
Woodside Site Representative	• support the Woodside Delivery Manager to ensure the controls detailed in this EP relevant to offshore activities are implemented on the offshore support vessel, and help collect and record evidence of implementation (other controls are implemented and evidence collected onshore). • support the Woodside Delivery Manager to ensure the EPOs are met and the PSs detailed in this EP are implemented on the offshore support vessel. • support the Woodside Delivery 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.

It is the responsibility of all Woodside employees and contractors to implement the Woodside Corporate Health, Safety and Environment Policy (**Appendix A**) in their areas of responsibility and that the personnel are suitably trained and competent in their respective roles.

8.4 Training and Competency

8.4.1 Overview

Woodside as part of its contracting process assesses a proposed contractor's environmental management systems to determine the level of compliance with the standard AS/NZ ISO 14001. This assessment is performed for the Petroleum Activities Program as part of the premobilisation 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 training is required for all personnel, detailing awareness and compliance with the contractor's environmental policy and environmental management system.

8.4.2 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
- regulations relevant to the activity
- woodside's Environmental Management System – Health, Safety and Environment Policy
- EP importance/structure/implementation/roles and responsibilities
- main environmental aspects/hazards and potential environmental impacts and related performance outcomes
- oil spill preparedness and response
- monitoring and reporting on performance outcomes and standards using MC
- incident reporting.

8.4.3 Petroleum Activities Program Specific Environmental Awareness

Before the Petroleum Activities Program begins, 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 to the support vessel personnel. Attendance lists are recorded and retained.

During operations, regular HSE meetings will be held on the project vessels. During these meetings, recent environmental incidents are reviewed and awareness material presented.

8.4.4 Management of Training Requirements

All personnel on the 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.

8.5 Monitoring, Auditing, Management of Non-conformance and Review

8.5.1 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 7** 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.

8.5.1.1 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 personnel to record and submit safety and environment risk observation cards on a routine basis (frequency varies with contractor)
- collection of evidence of compliance with the controls detailed in the EP relevant to offshore activities by the Woodside HSE Adviser (other compliance evidence is collected onshore)
- environmental discharge reports that record volumes of planned and unplanned discharges to ocean and atmosphere
- monitoring of progress against key performance indicators
- internal auditing and assurance program as described in **Section 8.5.1.2**.

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 8.5.1**and **8.5.1.2**.

8.5.1.2 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). Relevant knowledge is defined as:

- environmental science supporting the description of the existing environment
- socio-economic environment and stakeholder information
- environmental legislation.

The frequency and record of reviews, communication of relevant new knowledge and consideration of management of change are documented in the WMS Environment Plan Guideline.

Under the Oil Spill Scientific Monitoring Program preparedness, an annual review and update to the environmental baseline studies database is completed and documented. Periodic location-focused environmental studies and baseline data gap analyses are completed and documented. Any

subsequent studies scoped and executed as a result of such gap analysis are managed by the Environment Science Team and tracked via the Corporate Environment Baseline Database.

8.5.2 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.

8.5.3 Wellhead Removal Activities

Internal audits will be conducted to review the environmental performance of the Petroleum Activities Program, specifically:

- 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. Offshore support vessels associated with the above scopes will be audited by Woodside. General support 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. 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. wellhead removal).
- contractor-specific HSE audits will also be conducted of the associated general 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 8.5.1** and collection of evidence for measurement criteria are used to assess EPOs and standards.

As part of Woodside's Environmental Management System (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 8.8.3** and **8.8.4**.

8.5.3.1 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.

The process is mandatory for all vessels (other than tankers and floating production storage and offloading vessels) hired for Woodside operations, 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:

- offshore vessel management system assessment (OVMSA)
- DP system verification
- vessel inspections
- OVID or condition and suitability assessment
- 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 have been made to complete this (e.g. short term vessel hire), the Marine Assurance Specialist Offshore may approve the use of an alternate means of inspection, known as a risk assessment.

8.5.3.2 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.

8.5.4 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 HSE Event Reporting and Investigation Procedure which includes 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 2.7**). Detailed investigations are completed for all categories A, B, C and high potential environmental incidents.

8.5.5 Review

8.5.5.1 Management Review

Within the Environment function, senior management regularly monitors and reviews environmental performance and the effectiveness of managing environmental risks and performance. Within each Function and Business Unit Leadership Team, managers regularly review environmental performance, including through HSE Review meetings.

Risks are also reviewed before the activity commences, including operational, safety and environmental risks of the Petroleum Activities Program, to support continuous improvement as outlined in the Woodside Risk Management Framework (refer to **Section 2.2**).

8.5.5.2 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.

8.5.5.3 Review of Impacts, Risks and Controls Across the Life of the EP

In the unlikely case 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 8.6**).

8.6 Management of Change and Revision

8.6.1 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 4**) including: review of advances in technology at stages where new equipment may be selected such as vessel contracting; changes in understanding of the environment, DAWE 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 5.8**); 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 2.6**) 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.

8.6.2 OPEP Management of Change and Revision

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 resubmission of the EP, including the OPEP, is required (see **Section 8.6.1**). 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.

8.7 Record Keeping

Compliance records (outlined in Measurement Criteria in **Section 7**) will be maintained.

Record keeping will be in accordance with Regulation 14(7) that addresses maintaining records of emissions and discharges.

8.8 Reporting

To meet the EPOs and standards outlined in this EP, Woodside reports at a number of levels, as outlined in the next sections.

8.8.1 Routine Reporting (Internal)

8.8.1.1 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.

8.8.1.2 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.

8.8.1.3 Performance Reporting

Monthly and quarterly performance reports are developed and reviewed by the Function and Business Unit Leadership Teams (e.g. Drilling and Completions). 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.

8.8.2 Routine Reporting (External)

8.8.2.1 Start and End Notifications of the Petroleum Activities Program

In accordance with Regulation 29, Woodside will notify NOPSEMA and DMIRS of the commencement of the Petroleum Activities Program at least ten days before the activity commences and will notify NOPSEMA and DMIRS within ten days of completing the activity.

8.8.2.2 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 8-2**.

Table 8-2 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 EPIs, controls and standards outlined in this EP, in accordance with the Environment Regulations.

8.8.2.3 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.

8.8.3 Incident Reporting (Internal)

The process for reporting environmental incidents is described in **Sections 8.8.3** and **8.8.4** 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.

8.8.4 Incident Reporting (External) – Reportable and Recordable

8.8.4.1 Reportable Incidents

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 **Figure 2-6**)).
- 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 **Figure 2-6**)).

The environmental risk assessment (**Section 7**) for the Petroleum Activities Program identifies those risks with a potential consequence level of C+ for environment. The incidents that have the potential to cause this level of impact include hydrocarbon loss of containment events to the marine environment resulting from a vessel fuel tank rupture.

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.

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) 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 DAWE notified if MNES are to be affected by the oil spill incident.

8.8.4.2 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.

8.8.4.3 Other External Incident Reporting Requirements

In addition to the notification and reporting of environmental incidents defined under the Environment Regulations and Woodside requirements, **Table 8-3** describes the incident reporting requirements that also apply in the Operational Area.

Table 8-3 External Incident Reporting Requirements

Event	Responsibility	Notifiable Party	Notification requirements	Contact	Contact detail
Any marine incidents during Petroleum Activities Program	Vessel Master	AMSA	Incident Alert Form 18 as soon as reasonably practicable* Within 72 hours after becoming aware of the incident, submit Incident Report Form 19	AMSA	reports@amsa.gov.au
Oil pollution incidents in Commonwealth waters	Vessel Master	AMSA Rescue Coordination Centre (RCC)	As per Article 8 and Protocol I of MARPOL within two hours via the national emergency 24-hour notification contacts and a written report within 24 hours of the request by AMSA	AMSA RCC Australia	If the ship is at sea, reports are to be made to: Free call: 1800 641 792 Phone: 08 9430 2100 (Fremantle)
Oil pollution incidents in Commonwealth waters	Vessel Master	AMSA	Without delay as per Protection of the Sea Act, part II, section 11(1), AMSA RCC notified verbally via the national emergency 24-hour notification contact of the hydrocarbon spill; follow up with a written Pollution Report ASAP after verbal notification	RCC Australia	Phone: 1800 641 792 Or +61 2 6230 6811 AFTN: YSARYCYX
Any oil pollution incident which has the potential to enter a National Park or requires oil spill response activities to be conducted within a National Park	Vessel Master	DAWE	Reported verbally, ASAP	DNP	Phone: 02 6274 2220
Activity causes unintentional death of or injury to fauna species listed as Threatened or Migratory under the EPBC Act	Vessel Master	DAWE	Within seven days of becoming aware	Secretary of the DAWE	Phone: 1800 803 772 Email: protected.species@environment.gov.au

The pollution activities should also be reported to AMSA via RCC Australia by the Vessel Master are:

- any 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 Eaglehawk Wellhead Decommissioning 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.

8.9 Emergency Preparedness and Response

8.9.1 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 8-4**.

Table 8-4 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**). In accordance with Regulation 31 of the Environmental Regulations the Woodside Oil Pollution Emergency Arrangements (Australia) was provided with the Julimar Phase 2 Drilling and Subsea Installation EP, accepted by NOPSEMA on 8 November 2019.
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 8.10.3** Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**)

Content	Environment Regulations Reference	Document/Section Reference
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**)
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)

8.9.2 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 (**Table 8-5**). 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 8-5: Minimum levels of competency for key IMT positions

IMT Position	Minimum Competency
Corporate Incident Coordinate Centre (CICC) Leader	• Incident and Crisis Leadership Development Program (ICLDP). • Oil Spill Response Skills Enhancement Course (OSREC – internal course). • participation in L2 oil spill exercise (initial). • participation in L2 oil spill exercise (refresher).
Security & Emergency Manager Duty Manager	• ICLDP. • OSREC. • 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. • ICC Fundamentals Course (internal course). • participation in L2 oil spill exercise (initial). • participation in L2 oil spill exercise (refresher).
Environment Coordinator	• ICC Fundamentals. • OSREC. • 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 ICC and field-based roles. The revised ICC 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 ICC 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).

8.9.3 Emergency Response Preparation

The Corporate Incident Coordination Centre (CICC), based in Woodside's head office in Perth, is the onshore coordination point for an offshore emergency. The CICC is staffed by an appropriately skilled team available on call 24-hours a day. The purpose of the team is to coordinate rescues, minimise damage to the environment and facilities, and to liaise with external agencies. A description of Woodside's Incident Command Structure and arrangements is further detailed in the Woodside OPEA (Australia). Roles and responsibilities for facility emergency response are outlined 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. The ERP 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 an emergency of any type, the Vessel Master will assume overall onsite command and act as the Incident Controller (IC). All persons aboard the vessel will be required to act under the IC's directions. The vessel will maintain communications with the onshore Project Manager and/or other emergency services. Emergency response support can be provided by the Contractor's emergency centre or WCC if requested by the IC.

The project vessels will have on-board equipment for responding to emergencies including medical, firefighting and hydrocarbon spill response equipment.

8.9.4 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. Spill response for this Petroleum Activities Program is described further in **Appendix D**.

The Hydrocarbon Spill Preparedness Manager is responsible for the management of Woodside's hydrocarbon spill response equipment, and for the maintenance of hydrocarbon spill preparedness and response documentation. In the event of a major spill, Woodside will request that AMSA (administrator of the National Plan) supports 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) document. AMSA and Woodside have a Memorandum of Understanding (MOU) 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 project vessel(s) will have a SOPEP in accordance with the requirements of MARPOL 73/78 Annex I. These plans outline responsibilities, specify procedures and identify resources available in

a hydrocarbon or chemical spill from vessel activities. The Oil Pollution First Strike Plan is intended to work in conjunction with the SOPEPs and provides immediate actions required to commence a response if hydrocarbons are released to the marine environment.

Woodside has established EPOs, EPSs and MCs to be used for oil spill response during the Petroleum Activities Program, as detailed in **Appendix D**.

8.10 Emergency and Spill Response

Woodside categorises incidents and emergencies in relation to response requirements as follows:

8.10.1.1 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 or regionally based teams using existing resources and functional support services.

8.10.1.2 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 CICC.

8.10.1.3 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 ICC may also be activated as required to manage the operational incident response

8.10.2 Emergency and Spill Response Drills and Exercises

Testing of Woodside's capability to respond to incidents will be conducted in alignment with the Emergency and Crisis Management Procedure. The scope, frequency and objective of these tests is described in **Table 8-6.** 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, testing of arrangements register and OPEP where appropriate.

Table 8-6: Testing of response capability

Response Category	Scope	Response Testing Frequency	Response Testing Objective
Level 1 Response	Exercises are project-/ activity-specific	At least one Level 1 First Strike drill must be conducted during an 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	• Comprehensive exercises test elements of the Oil Pollution First Strike Plan (**Appendix H**). • Emergency drills are scheduled to test other aspects of the Emergency Response Plan.

		least every 6 month hire period thereafter.	
Level 2 Response	Exercises are vessel specific	Level 2 Emergency Management exercises are relevant to activities with an operational duration of one month or greater. At least one Emergency Management exercise per MODU/vessel per campaign must be conducted within the first month of commencing the activity and then at every 6 month hire period thereafter, where applicable based on duration.	• Testing both the facility IMT response and/or that of the CICC following handover of incident control. Exercises 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.

8.10.3 Testing of Hydrocarbon Spill Response Arrangements

Woodside is required to test hydrocarbon spill response arrangements as per regulations 8B and 8C of the Environment Regulations. 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:

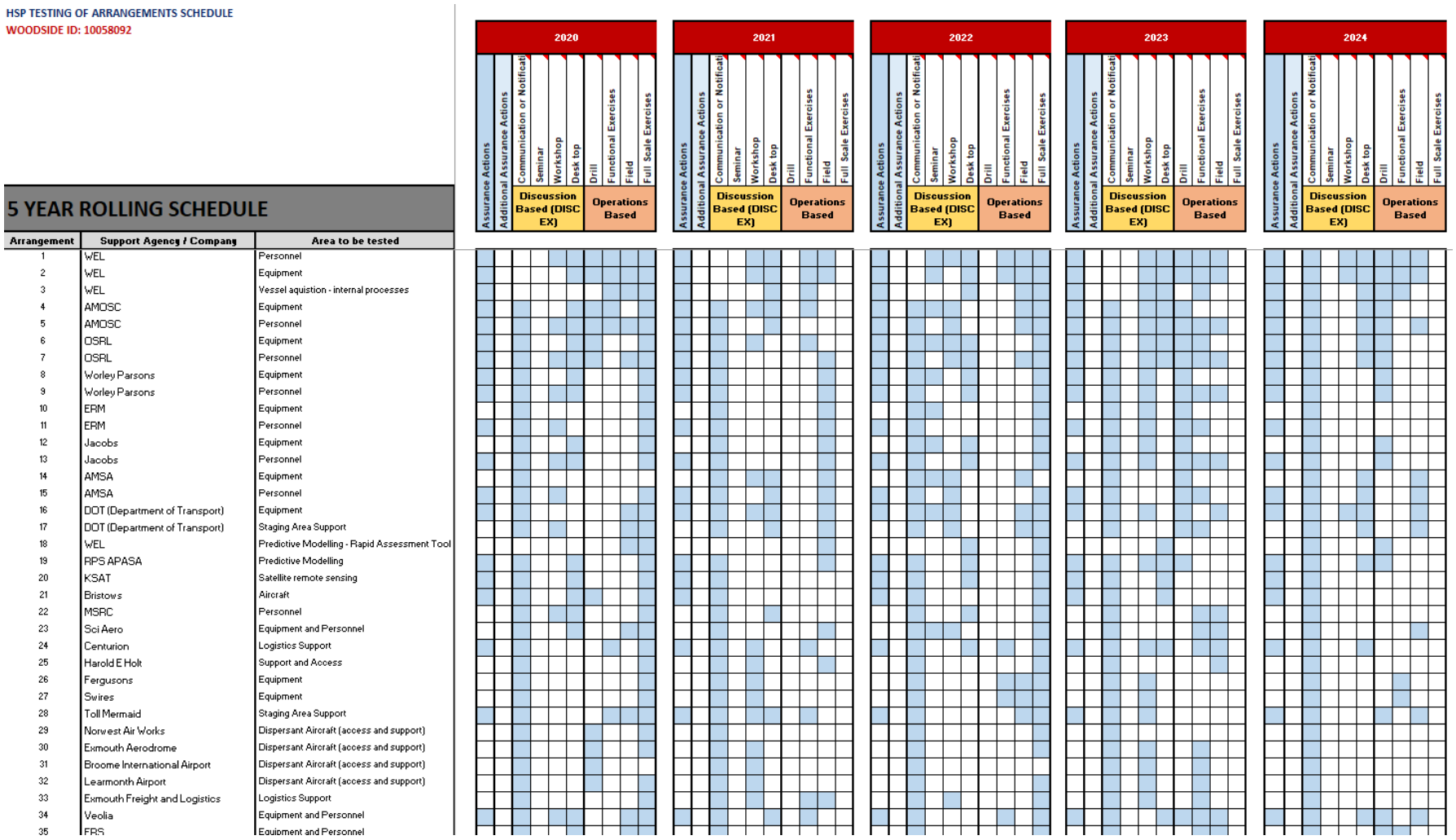
- ensure relevant responders, contractors and key personnel understand and practise their assigned roles and responsibilities
- test response arrangements and actions to validate response plans
- ensure lessons learned are incorporated into Woodside's processes and procedures and improvements are made where required.

If new response arrangements are introduced, or existing arrangements significantly amended, additional testing is undertaken accordingly. If the project vessels leave the field for extended periods, 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 8-6**, up to eight formal exercises are planned annually, across Woodside, to specifically test arrangements for responding to a hydrocarbon spill to the marine environment.

8.10.3.1 Testing of Arrangements Schedule

Woodside's Testing of Arrangements Schedule (**Figure 8-1**) aligns with international good practice for spill preparedness and response management; the testing is compatible with the IPIECA Good Practice Guide and the Australian Emergency Management Institute Handbook. If a spill occurs, enacting these arrangements will underpin Woodside's ability to implement a response across its petroleum activities. **Figure 8-1** shows a condensed snapshot of Woodside's 5-year rolling Testing of Arrangements Schedule.



HSP TESTING OF ARRANGEMENTS SCHEDULE
WOODSIDE ID: 10058092

5 YEAR ROLLING SCHEDULE

Arrangement	Support Agency / Company	Area to be tested
1	WEL	Personnel
2	WEL	Equipment
3	WEL	Vessel aquistion - internal processes
4	AMOSC	Equipment
5	AMOSC	Personnel
6	OSRL	Equipment
7	OSRL	Personnel
8	Worley Parsons	Equipment
9	Worley Parsons	Personnel
10	ERM	Equipment
11	ERM	Personnel
12	Jacobs	Equipment
13	Jacobs	Personnel
14	AMSA	Equipment
15	AMSA	Personnel
16	DOT (Department of Transport)	Equipment
17	DOT (Department of Transport)	Staging Area Support
18	WEL	Predictive Modelling - Rapid Assessment Tool
19	RPS APASA	Predictive Modelling
20	KSAT	Satellite remote sensing
21	Bristows	Aircraft
22	MSRC	Personnel
23	Sci Aero	Equipment and Personnel
24	Centurion	Logistics Support
25	Harold E Holt	Support and Access
26	Fergusons	Equipment
27	Swires	Equipment
28	Toll Mermaid	Staging Area Support
29	Norwest Air Works	Dispersant Aircraft (access and support)
30	Exmouth Aerodrome	Dispersant Aircraft (access and support)
31	Broome International Airport	Dispersant Aircraft (access and support)
32	Learmonth Airport	Dispersant Aircraft (access and support)
33	Exmouth Freight and Logistics	Logistics Support
34	Veolia	Equipment and Personnel
35	ERS	Equipment and Personnel

Figure 8-1: Indicative 5-yearly testing of arrangements schedule

(Snapshot of a selection of oil spill response arrangements tested annually; Note: schedule is subject to change, additional detail is included in the live document)

Numbered hydrocarbon spill arrangements listed in the rows of the schedule are taken from the support plans and operational plans described in Section 1.4 of **Appendix D**. 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. About 75 hydrocarbon spill preparedness arrangements are tested annually across the eight planned exercises, as described above.

The vertical columns under each year in **Figure 8-1** relate to an individual exercise or additional assurance actions that are conducted over the 5-year rolling schedule. The sub-heading for the column describes the standard method of testing (e.g. discussion exercise, desktop exercise), and the blue cells indicate the arrangements that could be tested for each method.

Arrangements in the schedule are tested at least once a year; however, 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) (refer to the first and second vertical columns for each year in **Figure 8-1**).

8.10.3.1 Exercises, Objectives, and KPIs

Exercises are designed to cumulatively provide assurance for all arrangements within Woodside's Testing of Arrangements Schedule annually across all facilities. Exercise-initiating scenarios are derived from the worst-case credible scenarios as described in the relevant facility's First Strike Plans.

Objectives and KPIs for each exercise are determined by reviewing:

- the Testing of Arrangements Schedule, which identifies which arrangements can be tested for each testing method (**Figure 8-1**).
- the objectives and KPIs master generic plan, which summarises generic objectives and KPIs that could be tested for specific response strategies, based on industry good practice guidance (i.e. IPIECA) for testing oil spill arrangements.
- the oil spill ALARP commitments register, which summarises all spill response commitments from accepted EPs (e.g. timings, numbers) for different response strategies, and considers priority commitments and worst-cast spill scenarios.
- actions undertaken from recommendations from previous exercises, where relevant.

The required capabilities, number of personnel, equipment, and timeframes (i.e. arrangements) form specific KPIs during an exercise. Where this is the case, the ALARP commitments register indicates the specific response strategy performance standards to use/test the arrangements against. Where relevant the most stringent performance standard across all in-force EPs is used as the KPI. After each exercise, a report is produced that includes recommendations for improvements, which are then converted to actions and tracked in the Testing of Arrangements Register.

Additional assurance actions are also routinely undertaken outside formal exercises (e.g. response audits, no-notice drills), which support testing of these arrangements. Evidence and outcomes from additional assurance actions are used, where relevant, to support testing individual arrangements, including from external sources (e.g. evidence of suppliers testing their own arrangements).

8.10.4 Cyclone and Dangerous Weather Preparation

As the timing of some activities associated with the Petroleum Activities Program are not yet determined, it is possible activities will overlap with the cyclone season (November to April, with most cyclones occurring between January and March). If the Petroleum Activities Program occurs in cyclone season, the project 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 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).

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10. GLOSSARY AND ABBREVIATIONS

10.1 Glossary

Term	Meaning
(the) Regulator	The Government Agency (State or Commonwealth) that is the decision maker for approvals and undertakes ongoing regulation of the approval once granted.
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)	is a measure of how heavy or light a petroleum liquid is compared to water
Australian Standard	An Australian Standard which 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 which 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

Term	Meaning
Datum	A reference location or elevation which is used as a starting point for subsequent measurements
dB	Decibel – this is 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 (1mPa), 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 1mPa2/Hz), or over a broadband which has not been filtered. Where a frequency is not specified, it can be assumed that the measurement is a broadband measurement
dB re 1μPa^2.s	Normal unit for sound exposure level
Demersal	Living close to the floor of the sea (typically of fish)
Drill casing	Tubing that is set inside the drilled well to protect and support the well stream
Drilling fluids	The main functions of drilling fluids include providing hydrostatic pressure to prevent formation fluids from entering into the well bore, keeping the drill bit cool and clean during drilling, carrying out drill cuttings, and suspending the drill cuttings while drilling is paused and when the drilling assembly is brought in and out of the hole. The drilling fluid used for a particular job is selected to avoid formation damage and to limit corrosion. The three main categories of drilling fluids are water-based muds (which can be dispersed and non-dispersed), non-aqueous muds, usually called oil-based mud, and gaseous drilling fluid, in which a wide range of gases can be used.
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
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).
Environment Plan	Prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009, which must be assessed and accepted by the Designated Authority (NOPSEMA) before any petroleum-related activity can be carried out
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).

Term	Meaning
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
Fauna	Collectively, the animal life of a particular region
Flora	Collectively the plant life of a particular region
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 Environmental Management System or EMS) for controlling and improving a company's environmental performance. An EMS provides a framework for managing environmental responsibilities so that they become more efficient and more integrated into overall business operations.
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 minimize pollution of the seas, including dumping, oil and exhaust pollution. Its stated object is to preserve the marine environment through the complete elimination of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances
Mitigation	Management measures which minimise and manage undesirable consequences
pH	measure of the acidity or basicity of an aqueous solution
Protected Species	Threatened, vulnerable or endangered species which 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
Sessile	Organism that is fixed in one place; immobile
Zooplankton	Plankton consisting of small animals and the immature stages of larger animals

10.2 Abbreviations

Abbreviation	Meaning
µm	Micrometer

Abbreviation	Meaning
AHO	Australian Hydrographic Office
AIMS	Australian Institute of Marine Science
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
APASA	Asia Pacific Applied Science Associates
API	American Petroleum Institute
APPEA	Australian Petroleum Production and Exploration Association
AS (NZS)	Australian Standard (New Zealand Standard)
ASAP	As soon as practicable
ATSB	Australian Transport Safety Bureau
AWJ	Abrasive water jet
BIA	Biologically Important Area
BMSL	Below mean seal level
CCP	Cyclone Contingency Plan
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CICC	Corporate Incident Communication Centre
CoA	Commonwealth of Australia
COABIS	Component Orientated Anomaly Based Inspection System
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CV	Company Values
D&C	Woodside Drilling and Completions Functional Division
DAA	Department of Aboriginal Affairs
DAFF	Department of Fisheries and Forestry
dB	Decibel
DEC	Department of Environment and Conservation
DEWHA	Department of Environment, Water, Heritage and the Arts
DNP	Director of National Parks
DoEE	Department of Environment and Energy
DP	Dynamically Positioned
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EAAF	East Asian Australian Flyway
EC_{50}	half maximal effective concentration
EEZ	Exclusive Economic Zone
EMBA	Environment that may be affected
EMS	Environmental Management System
ENVID	Environmental hazard Identification
EP	Environment Plan

Abbreviation	Meaning
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPO	Environmental Performance Outcome
ERP	Emergency Response Plans
ESD	Ecologically sustainable development
EPS	Environmental Performance Standard
FPSO	Floating Production, Storage and Offtake vessel
FRDC	Fisheries Research and Development Centre
g/m^2	Grams per square metre
GP	Good Practice
HAZID	Hazard identification
HSE	Health, Safety and Environment
HQ	Hazard Quotient
HZ	Hertz
IAP	Incident Action Plan
IAPP	International Air Pollution Prevention
IC_{50}	Half maximal inhibitory concentration
IMO	International Maritime Organisation
IMR	Inspection, Maintenance and Repair vessel
IMS	Invasive Marine Species
IOPP	International Oil Pollution Prevention
IPIECA	International Petroleum Industry Environmental Conservation Association
ISPP	International Sewage Pollution Prevention Certificate
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union for Conservation of Nature
JHA	Job Hazard Assessment
KEF	Key Ecological Feature
kHz	Kilohertz
km	Kilometre
kPa	Kilopascal
KPI	Key Performance Indicator
L	Litres
LAT	Lowest Astronomical Tide
LC_{50}	Lethal concentration, 50%
LCS	Legislation, Codes and Standards
LED	Light emitting diode
LNG	Liquefied Natural Gas
MC	Measurement criteria
MMO	Marine Mammal Observer
MNES	Matters of National Environmental Significance (under the EPBC Act)

Abbreviation	Meaning
MODIS	Moderate Resolution Imaging Spectrometer
MoU	Memorandum of Understanding
MPA	Marine Protected Areas
ms^{-1}	Meters per second
NEBA	Net Environment Benefit Assessment
NIMS	Non-indigenous Marine Species
nm	Nautical mile (1,852 m) a unit of distance on the sea
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 Materials
NRC	National Research Council
NWBM	Non Water Based Mud
NWMR	North-west Marine Region
NWP	Northwest Province
NSW	Northwest Shelf
OCNS	Offshore Chemical Notification Scheme
OIM	Offshore Installation Manager
OIW	Oil in water
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act*
OSAP	Oil Spill Action Plan
OSCP	Oil Spill Contingency Plan – OPGGSR term
OSPAR	Oslo and Paris Commission for the Convention for the Protection of the Marine Environment of the North-East Atlantic
OSRL	Oil Spill Response Limited
OSRP	Oil Spill Response Plan – Woodside's OSCP equivalent
OSTM	Oil Spill Trajectory Modelling
P&A	Plugging and abandonment
PBA	Pre-emptive Baseline Areas
PGB	Permanent Guide Base
PIC	Person in Charge
PJ	Professional Judgement
PLONOR	OSPAR definition of a substance Poses Little or No Risk to the environment
PMST	Protected Matters Search Tool
POLREP	Pollution Report
ppb	Parts Per Billion
ppm	Parts Per Million
PTW	Permit To Work
RBA	Risk Based Analysis
RCC	Rescue Co-ordination Centre

Abbreviation	Meaning
RMS	Root Mean Square
ROV	Remotely Operated Vehicle
SIMAP	Spill Impact Mapping and Analysis Program
SOLAS	Safety of Life at Sea
SOPEP	Ship Oil Pollution Emergency Plan
SPL	Sound Pressure Levels
SV	Societal Values
TGB	Temporary Guide Base
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
UK	United Kingdom
VOC	Volatile Organic Compounds
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WBM	Water Based Mud
WCC	Woodside Communication Centre
WEL	Woodside Energy Ltd
WHA	World Heritage Area
WMS	Woodside Management System
Woodside	Woodside Energy Ltd

APPENDIX A: CORPORATE HEALTH, SAFETY AND ENVIRONMENT POLICY AND RISK MANAGEMENT POLICY

WOODSIDE POLICY

Woodside

Health, Safety and Environment Policy

OBJECTIVES

Strong health, safety and environment (HSE) performance is essential for the success and growth of our business. Our aim is to be recognised as an industry leader in HSE through managing our activities in a sustainable manner with respect to our workforce, our communities and the environment.

At Woodside we believe that process and personal safety related incidents, and occupational illnesses, are preventable. We are committed to managing our activities to minimise adverse health, safety or environmental impacts.

PRINCIPLES

Woodside will achieve this by:

- implementing a systematic approach to HSE risk management
- complying with relevant laws and regulations and applying responsible standards where laws do not exist
- setting, measuring and reviewing objectives and targets that will drive continuous improvement in HSE performance
- embedding HSE considerations in our business planning and decision-making processes
- integrating HSE requirements when designing, purchasing, constructing and modifying equipment and facilities
- maintaining a culture in which everybody is aware of their HSE obligations and feels empowered to speak up and intervene on HSE issues
- undertaking and supporting research to improve our understanding of HSE and using science to support impact assessments and evidence-based decision making
- taking a collaborative and pro-active approach with our stakeholders
- requiring contractors to comply with our HSE expectations in a mutually beneficial manner
- publicly reporting on HSE performance

APPLICATION

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.

Updated by the Board in April 2021

WOODSIDE POLICY

Woodside

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.

APPLICATION

The Managing Director of Woodside is accountable to the Board of Directors for ensuring this policy is effectively implemented.

Managers are responsible for promoting and applying the Risk Management Policy. Responsibility for the effective application of this policy rests with all Woodside employees, contractors and joint venturers engaged in activities under Woodside operational control.

This policy will be reviewed regularly and updated as required.

Revised by the Woodside Petroleum Ltd Board on 4 December 2020.

APPENDIX B: RELEVANT LEGISLATIVE REQUIREMENTS

This appendix refers to Commonwealth Legislation related to the project. Western Australian State Legislation relevant to an accidental release of hydrocarbons in WA State waters is outlined in the Julimar Phase 2 Drilling and Subsea Installation Oil Pollution Emergency Plan.

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*	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.
Environment Protection and Biodiversity Conservation Act 1999 • *Environment Protection and Biodiversity Conservation Regulations 2000*	This Act protects matters of national environmental significance (NES). It streamlines the national environmental assessment and approvals process, protects Australian biodiversity and integrates management of important natural and culturally significant places. Under this Act, actions that may be likely to have a significant impact on matters of NES must be referred to the Commonwealth Environment Minister.
Environment Protection (Sea Dumping) Act 1981 • *Environment Protection (Sea Dumping) Regulations 1983*	This Act provides for the protection of the environment by regulating dumping matter into the sea, incineration of waste at sea and placement of artificial reefs.
Industrial Chemicals (Notification and Assessment Act) 1989 • *Industrial Chemicals (Notification and Assessment) Regulations 1990*	This Act creates a national register of industrial chemicals. The Act also provides for restrictions on the use of certain chemicals which could have harmful effects on the environment or health.

Commonwealth Legislation	Legislation Summary
National Environment Protection Measures (Implementation) Act 1998 • *National Environment Protection Measures (Implementation) Regulations 1999*	This Act and Regulations provide for the implementation of National Environment Protection Measures (NEPMs) to protect, restore and enhance the quality of the environment in Australia and ensure that the community has access to relevant and meaningful information about pollution. The National Environment Protection Council has made NEPMs relating to ambient air quality, the movement of controlled waste between states and territories, the national pollutant inventory, and used packaging materials.
National Greenhouse and Energy Reporting Act 2007 • *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015*	This Act and associated Rule establishes the legislative framework for the NGER scheme for reporting greenhouse gas emissions and energy consumption and production by corporations in Australia.
Navigation Act 2012 • *Marine order 12 – Construction – subdivision and stability, machinery and electrical installations* • *Marine order 30 - Prevention of collisions* • *Marine order 47 - Mobile offshore drilling units* • *Marine order 57 - Helicopter operations* • *Marine order 60 - Floating offshore facilities* • *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.
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.

Commonwealth Legislation	Legislation Summary
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 prevention—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 REPORT

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.

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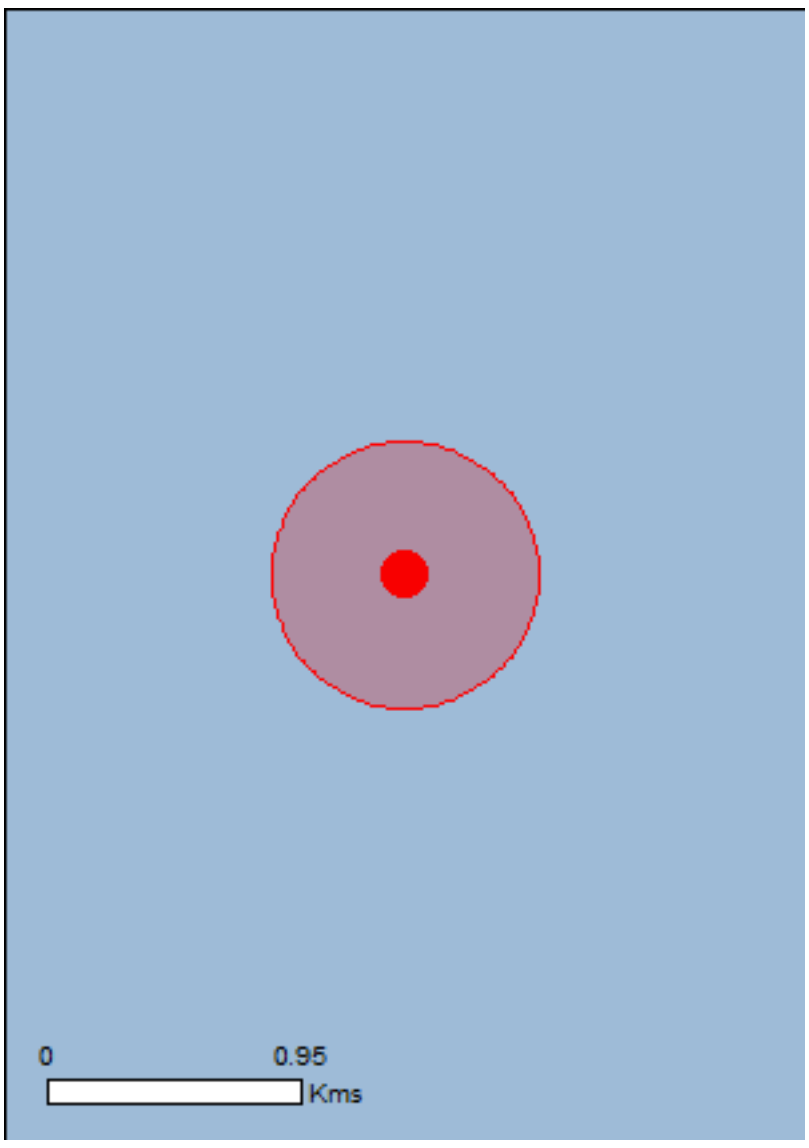

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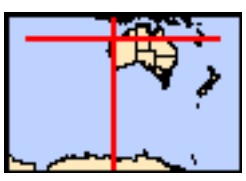

Summary

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:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	15
Listed Migratory Species:	31

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:	53
Whales and Other Cetaceans:	22
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	1

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

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 Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	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
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	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
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
Sharks		
Carcharodon carcharias		
White Shark, Great White Shark [64470]	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

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 may occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
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 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

Name	Threatened	Type of Presence
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
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
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may 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 may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat likely 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 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
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

Name	Threatened	Type of Presence
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 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]
* 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 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
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Fish		
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
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	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
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

Name	Threatened	Type of Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to 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 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
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat likely 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 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 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
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 (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

Extra Information

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

Name	Region
Ancient coastline at 125 m depth contour	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

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Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

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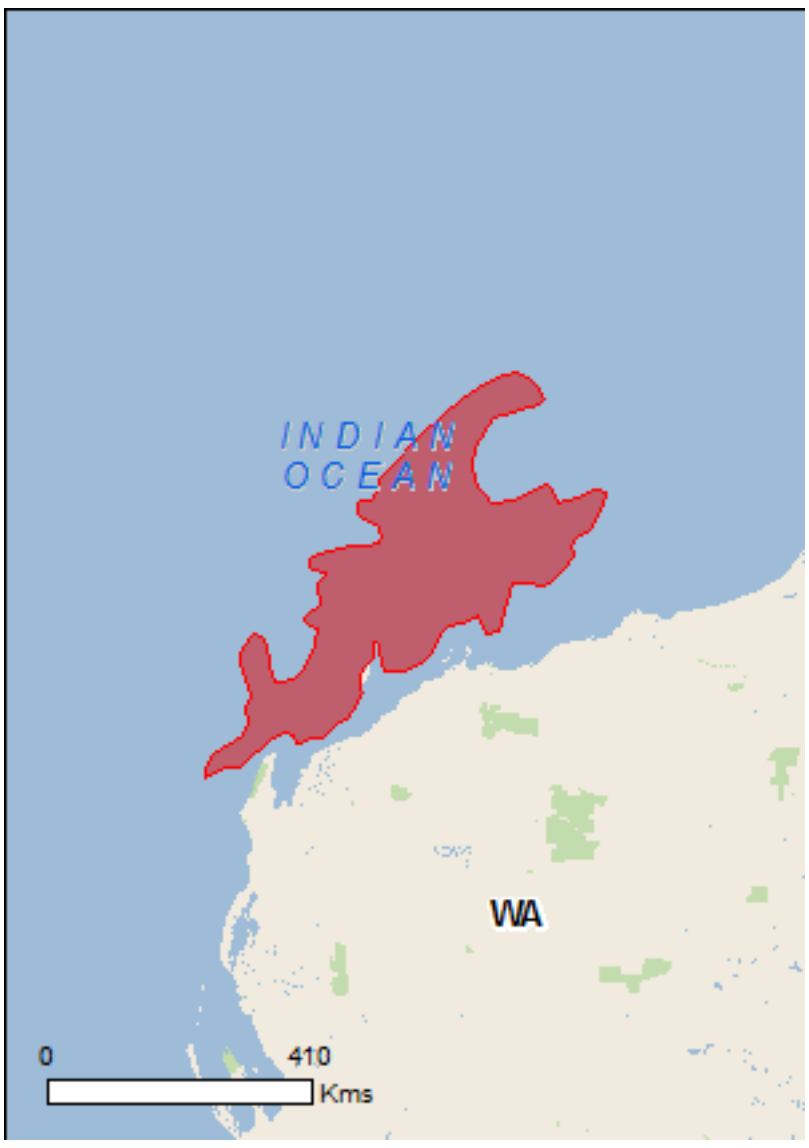
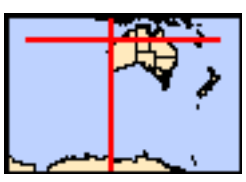


Coordinates

Buffer: 0.0Km



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:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	38
Listed Migratory Species:	54

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:	95
Whales and Other Cetaceans:	29
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	4

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	5

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
The Ningaloo Coast	WA	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
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 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

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 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
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
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

Name	Status	Type of Presence
Papasula abbotti		
Abbott's Booby [59297]	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 may occur within area
Sternula nereis nereis		
Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Fish		
Milyeringa veritas		
Blind Gudgeon [66676]	Vulnerable	Species or species habitat may 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 Barrow and Boodie Islands subspecies		
Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon auratus barrowensis		
Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus		
Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus Central Australian subspecies		
Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Breeding known 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 may occur within area
Reptiles		

Name	Status	Type of Presence
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	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
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
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	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	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

Name	Threatened	Type of Presence
		habitat likely to occur within area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
[Fregata minor](#) Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
[Hydroprogne caspia](#) Caspian Tern [808]		Breeding known to occur within area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
[Onychoprion anaethetus](#) Bridled Tern [82845]		Breeding known to occur within area
[Phaethon lepturus](#) White-tailed Tropicbird [1014]		Foraging, feeding or related behaviour likely to occur within area
[Sterna dougallii](#) Roseate Tern [817]		Breeding known to occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
[Anoxypristis cuspidata](#) Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
[Balaena glacialis australis](#) Southern Right Whale [75529]	Endangered*	Species or species habitat likely 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	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding known to occur

Name	Threatened	Type of Presence
		within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat 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
[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 within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area
[Physeter macrocephalus](#) Sperm Whale [59]		Species or species habitat may occur within area
[Pristis clavata](#) Dwarf Sawfish, Queensland Sawfish [68447]	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	Foraging, feeding or related behaviour known to occur within area
[Sousa chinensis](#) Indo-Pacific Humpback Dolphin [50]		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
Migratory Terrestrial Species		
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		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 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
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

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		
* 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
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely 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 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
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely 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 likely 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
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to 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
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
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
Pandion haliaetus Osprey [952]		Breeding known to occur

Name	Threatened	Type of Presence
		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
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely 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
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may 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 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 impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	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

Name	Threatened	Type of Presence
		habitat may occur within area
[Corythoichthys flavofasciatus](#) Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
[Cosmocampus banneri](#) Roughridge Pipefish [66206]		Species or species habitat may occur within area
[Doryrhamphus dactyliophorus](#) Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
[Doryrhamphus excisus](#) Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
[Doryrhamphus janssi](#) Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
[Doryrhamphus multiannulatus](#) Many-banded Pipefish [66717]		Species or species habitat may occur within area
[Doryrhamphus negrosensis](#) Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
[Festucalex scalaris](#) Ladder Pipefish [66216]		Species or species habitat may occur within area
[Filicampus tigris](#) Tiger Pipefish [66217]		Species or species habitat may occur within area
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area
[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

Name	Threatened	Type of Presence
		area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
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 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

Name	Threatened	Type of Presence
		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	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat 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 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 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
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

Name	Status	Type of Presence
		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
[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
[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
[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

Name	Status	Type of Presence
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
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
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Ningaloo	Recreational Use Zone (IUCN IV)

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Barrow Island	WA
Bessieres Island	WA
Boodie, Double Middle Islands	WA
Montebello Islands	WA
Unnamed WA44665	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
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Cuvier Abyssal Plain and the	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Glomar Shoals	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

-21.926507 113.724933,-21.975048 113.647125,-21.995749 113.5736,-21.985041 113.48437,-22.022161 113.357307,-22.089262 113.250231,-22.10568 113.184558,-22.088548 113.16814,-22.039293 113.175278,-21.900095 113.216681,-21.811579 113.275215,-21.557074 113.692783,-21.39646 113.74989,-21.218379 113.719937,-21.058479 113.792748,-20.750101 113.691383,-20.640884 113.665685,-20.513821 113.661402,-20.373194 113.729216,-20.298241 113.799173,-20.25327 113.890544,-20.274685 113.952648,-20.396037 114.035453,-20.632653 114.063979,-20.761144 114.088963,-20.864651 114.138932,-20.889635 114.253146,-20.857512 114.381637,-20.686191 114.531543,-20.379241 114.706433,-20.193643 114.731417,-20.100508 114.57797,-20.069099 114.545848,-20.001999 114.561552,-19.962737 114.605096,-19.911677 114.717141,-19.854569 114.756402,-19.793893 114.777817,-19.672205 114.736442,-19.617954 114.734301,-19.560846 114.758571,-19.486943 114.842062,-19.451251 114.824216,-19.407371 114.705033,-19.383815 114.632936,-19.346695 114.610093,-19.28816 114.612234,-19.203213 114.729304,-19.133257 115.05767,-19.106847 115.193492,-19.097924 115.37909,-19.064016 115.57718,-19.007664 115.614685,-18.855974 115.576019,-18.707393 115.335472,-18.651476 115.284313,-18.60002 115.269442,-18.540831 115.295616,-18.517334 115.350046,-18.492946 115.460586,-18.452495 115.516503,-18.396578 115.546247,-18.225552 115.575797,-18.036089 115.75326,-17.64312 116.137524,-17.353302 116.461607,-17.159138 116.721444,-17.013514 116.964149,-16.937822 117.109766,-16.871871 117.2444,-16.840651 117.329473,-16.829334 117.371229,-16.816456 117.455522,-16.819188 117.503132,-16.843383 117.590156,-16.911285 117.695131,-17.032651 117.807912,-17.157472 117.864422,-17.234209 117.816238,-17.417921 117.190674,-17.796255 116.919415,-18.046098 116.865878,-18.331634 116.969384,-18.545785 117.140705,-18.499916 117.489081,-18.314485 117.825756,-18.301398 117.917365,-18.348987 117.993508,-18.541211 118.056229,-18.479857 118.346858,-18.366833 118.564579,-18.345418 118.632393,-18.357315 118.675224,-18.402525 118.728761,-18.432268 118.73471,-18.623815 118.678793,-18.792756 118.593132,-18.881986 118.503902,-18.976271 118.324785,-19.083693 118.238847,-19.178229 118.275474,-19.253182 118.273095,-19.363299 118.159961,-19.567271 117.98637,-19.613671 117.878104,-19.58569 117.641498,-19.597662 117.448081,-20.212105 117.255875,-20.23352 117.080985,-20.002096 116.939557,-20.10146 116.783552,-20.16271 116.546946,-20.228145 116.469614,-20.490502 116.324316,-20.626131 116.164892,-20.736776 115.923377,-20.750077 115.73717,-20.730517 115.656359,-20.629118 115.617379,-20.421776 115.592738,-20.394389 115.584042,-20.363337 115.539427,-20.356912 115.513729,-20.365835 115.509802,-20.435434 115.499452,-20.491114 115.504092,-20.54715 115.504806,-20.710936 115.374688,-20.809024 115.31987,-20.850664 115.305593,-20.864595 115.30565,-20.887072 115.316688,-20.950697 115.313112,-20.981035 115.328103,-20.999773 115.35605,-21.15997 115.286153,-21.351517 115.132678,-21.437416 114.976823,-21.615875 114.804312,-21.589998 114.665783,-21.598624 114.619681,-21.675144 114.511191,-21.670727 114.452247,-21.661891 114.424676,-21.570854 114.382844,-21.518681 114.287772,-21.632572 114.048971,-21.926507 113.724933

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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APPENDIX D: OIL SPILL PREPAREDNESS AND RESPONSE MITIGATION ASSESSMENT

Oil Spill Preparedness and Response Mitigation Assessment for Eaglehawk-1 Wellhead Decommissioning Environment Plan

Security and Emergency Management
Hydrocarbon Spill Preparedness

November 2021
Revision 0

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EXECUTIVE SUMMARY

Woodside Energy Ltd (Woodside) has developed its oil spill preparedness and response position for the Eaglehawk-1 Wellhead Decommissioning, hereafter known as the Petroleum Activities Program (PAP).

This document demonstrates that the risks and impacts from an unplanned hydrocarbon release, and the associated response operations, are controlled to As Low as Reasonably Practicable (ALARP) and Acceptable levels. It achieves this by evaluating response options to address the potential environmental impacts resulting from an unplanned loss of hydrocarbon containment associated with the PAP described in the Environment Plan (EP). This document then outlines Woodside's decisions and techniques for responding to a hydrocarbon release event and the process for determining its level of hydrocarbon spill preparedness.

A summary of the key facts and references to additional detail within this document are presented in Table 0-1.

Table 0-1: Summary of the key details for assessment

Key details of assessment	Summary	Reference to additional detail
Credible Scenario	**Credible Scenario 3* (CS-03): Short-Term (Instantaneous) Surface Release of Marine Diesel Oil (MDO) in the WA-28-P Permit Area** A short-term (instantaneous) surface release of 500 m^3 of MDO at the south-eastern corner of the WA-28-P permit area (19° 44' 55.23" S, 116° 20' 04.74" E), representing loss of hydrocarbon containment after a vessel collision. **labelled as Credible Scenario 3 (CS-03) to be consistent with modelling data from modelling report.*	Section 2.2
Hydrocarbon Properties	**MDO** MDO is a mixture of volatile and persistent hydrocarbons with low proportions of highly volatile and residual components. In general, about 6% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); 35% should evaporate within the first 24 hours (180 °C < BP < 265 °C) (41% in total within first 24 hours); and 54% should evaporate over several days (265 °C < BP < 380 °C). Approximately 5% of the oil is shown to be persistent. Under calm conditions the majority of the remaining oil on the water surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation of the residual compounds will slow significantly, and they will then be subject to more gradual decay through biological and photochemical processes.	Section 6.7.1 of the EP Appendix A of the First Strike Plan (Link)

<table>
<tr><td rowspan="4">Modelling Results</td><td colspan="2">A quantitative, stochastic assessment has been undertaken for a credible spill scenario to help assess the environmental risk of a hydrocarbon spill from a vessel collision.
Data was available from a 2018 modelling assessment of a 500m^3 surface release of MDO at the south-eastern corner of the WA-28-P permit area (19° 44’ 55.23” S, 116° 20’ 04.74” E). The release location used for the spill modelling is located approximately 107km north-east of the Montebello Islands Group and approximately 25 km from the Operation Area, meaning that the spill site is located closer to the Western Australian shoreline than the Operation Area.
The results of the modelling can be used to demonstrate that a spill of the same volume, but closer to sensitive receptors and still within in the vicinity of the Operational Area has an Environment that May Be Affect (EMBA) that is not predicted to include any surface slicks above threshold volumes entering WA state waters, or any shoreline contact or accumulation. Basing the impact assessment for a vessel collision scenario on this modelling is considered reasonable and representative of the spill risk.
For CS-03, a total of 200 replicate simulations were completed over an annual period 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 (50 simulations per quarter).</td><td>Section 2.3</td></tr>
<tr><td>Minimum time to shoreline impact (above 100 g/m²)</td><td>NA – all modelled scenarios confirmed no shoreline contact above 100 g/m²</td><td></td></tr>
<tr><td>Largest volume ashore at any single Response Protection Area (RPA) (above 100 g/m²)</td><td>NA – all modelled scenarios confirmed no shoreline contact above 100 g/m²</td><td></td></tr>
<tr><td>Largest total shoreline accumulation (above 100 g/m²) all shorelines</td><td>NA – all modelled scenarios confirmed no shoreline contact above 100 g/m²</td><td></td></tr>
<tr><td>Net Environmental Benefit Analysis</td><td colspan="2">Monitor and Evaluate, Source Control via vessel Shipboard Oil Pollution Environment Plan (SOPEP), and 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.</td><td>Section 4</td></tr>
<tr><td>ALARP Evaluation of Selected Response Techniques</td><td colspan="2">The evaluation of the selected response techniques shows the proposed controls reduced the risk to an ALARP and Acceptable level for the risks presented in Sections 2 and 3, without the implementation of considered additional, alternative or improved control measures.</td><td>Section 6</td></tr>
</table>

1 INTRODUCTION

1.1 Overview

Woodside Energy Ltd (Woodside) has developed its oil spill preparedness and response position for the Eaglehawk-1 Wellhead Decommissioning, hereafter known as the Petroleum Activities Program (PAP). This document outlines Woodside's decisions and techniques for responding to a hydrocarbon loss of containment event and the process for determining its level of hydrocarbon spill preparedness.

1.2 Purpose

This document, together with the documents listed below, meet the requirements of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Environment Regulations) relating to hydrocarbon spill response arrangements.

- Eaglehawk-1 Wellhead Decommissioning Environment Plan (EP)
- Oil Pollution Emergency Arrangements (OPEA) (Australia)
- Eaglehawk-1 Wellhead Decommissioning Oil Pollution Emergency Plan (OPEP) including:
  - First Strike Plan (FSP)
  - Relevant Operations Plans
  - Relevant Tactical Response Plans (TRPs)
  - Relevant Supporting Plans
  - Data Directory.

The purpose of this document is to demonstrate that the risks and impacts from an unplanned hydrocarbon release and the associated response operations are controlled to As Low as Reasonably Practicable (ALARP) and Acceptable levels.

1.3 Scope

This document demonstrates that the risks and impacts from an unplanned hydrocarbon release, and the associated response operations, are controlled to As Low as Reasonably Practicable (ALARP) and Acceptable levels. It achieves this by evaluating response options to address the potential environmental risks and impacts resulting from an unplanned loss of hydrocarbon containment associated with the PAP described in the EP. This document then outlines Woodside's decisions and techniques for responding to a hydrocarbon release event and the process for determining its level of hydrocarbon spill preparedness. It should be read in conjunction with the documents listed in Table 1-1. The location of the Petroleum Activity Program is shown in Figure 3-1 of the EP.

1.4 Oil spill response document overview

The documents outlined in Table 1-1 and Figure 1-1 are collectively used to manage the preparedness and response for a hydrocarbon release.

The Oil Pollution First Strike Plan (FSP) (Link) 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 Monitor and Evaluate (ME) operations and the pre-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.

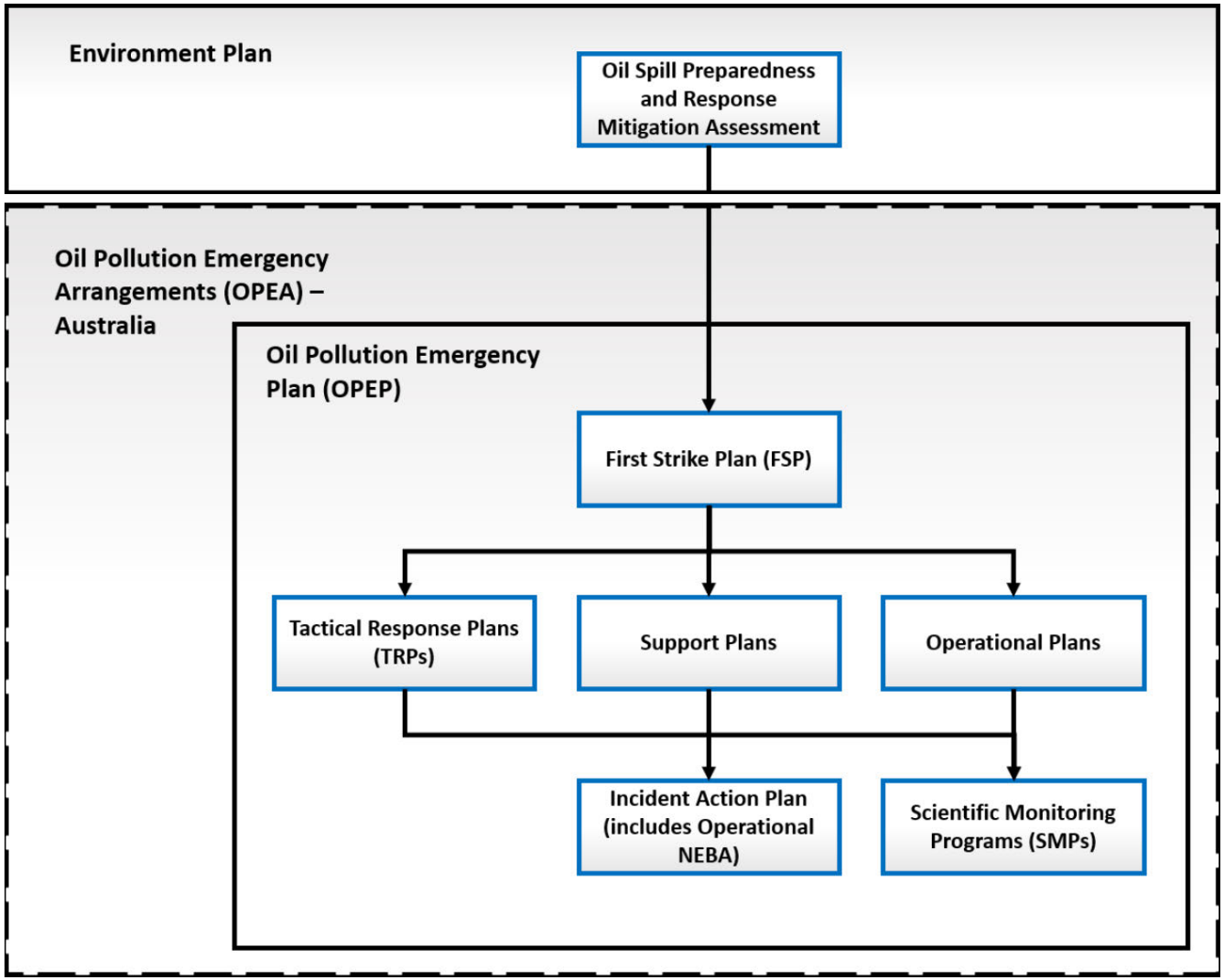

Figure 1-1: Woodside hydrocarbon spill document structure

Table 1-1: Hydrocarbon spill preparedness and response – document references

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Eaglehawk-1 Wellhead Decommissioning Environment Plan (EP)	Demonstrates that potential adverse impacts on the environment associated with the PAP (during both routine and non-routine operations) are mitigated and managed to As Low As Reasonably Practicable (ALARP) and will be of an acceptable level	NOPSEMA Woodside internal		EP Section 6 (Identification and evaluation of environmental risks and impacts, including credible spill scenarios) EP Section 7 (Implementation strategy – including emergency preparedness and response) EP Section 7 (Reporting and compliance) EP Section 6 (Performance outcomes, standards and measurement criteria)
Oil Pollution Emergency Arrangements (OPEA) Australia	Describes the arrangements and processes adopted by Woodside when responding to a hydrocarbon spill from a petroleum activity	Regulatory agencies Woodside internal	All	
Oil Spill Preparedness and Response Mitigation Assessment for the Eaglehawk-1 Wellhead Decommissioning Environment Plan (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 Control Centre (CICC): 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	

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Eaglehawk-1 Wellhead Decommissioning Oil Pollution First Strike Plan (FSP)	Facility specific document providing details and tasks required to mobilise a first strike response Primarily applied to the first 24 hours of a response until a full Incident Action Plan (IAP) specific to the event is developed Oil Pollution First Strike Plans are intended to be the first document used to provide immediate guidance to the responding IMT	Site-based IMT for initial response, activation and notification CICC for initial response, activation and notification CICC: Control function in an ongoing spill response for activity-specific response information	Initial notifications and reporting required within the first 24 hours of a spill event Relevant spill response options that could be initiated for mobilisation in the event of a spill Recommended pre-planned tactics Details and forms for use in immediate response. Activation process for oil spill trajectory 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	CICC: Operations and Logistics functions for first strike activities CICC: Planning Function to help inform the IAP on resources available	Locations from where resources may be mobilise How resources will be mobilised Details of where resources may be mobilised to and what facilities are required once the resources arrive Details on how to implement resources to undertake a response	Operational Monitoring Source Control via vessel Shipboard Oil Pollution Environment Plan (SOPEP) Oiled Wildlife Scientific Monitoring
Tactical Response Plans	Provides options for response techniques in selected Response Protection Area (RPAs). Provides site, access and deployment information to support a response at the location	CICC: 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	Modelling confirmed no shoreline impacts at response thresholds Available tactical response plans are listed in ANNEX E: Tactical Response Plans

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Support Plans	Support Plans detail Woodside's approach to resourcing and the provision of services during a hydrocarbon spill response	CICC: Operations, Logistics and Planning functions	Strategy for mobilising and managing additional resources outside of Woodside's immediate preparedness arrangements	Marine Logistics People and Global Capability Surge Labour Requirement Plan Health and Safety Aviation IT (First Strike Response) IT (Extended Response) Communications (First Strike Response) Communications (Extended Response) Stakeholder Engagement Accommodation and Catering Waste Management Guidance for Oil Spill Claims Management (Land based) Security Support Plan Hydrocarbon Spill Responder Health Monitoring Guideline

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 Eaglehawk-1 Wellhead Decommissioning First Strike Plan then summarises the outcome of the response planning process and provides initial response guidance and a summary of ongoing response activities, if an incident were to occur.

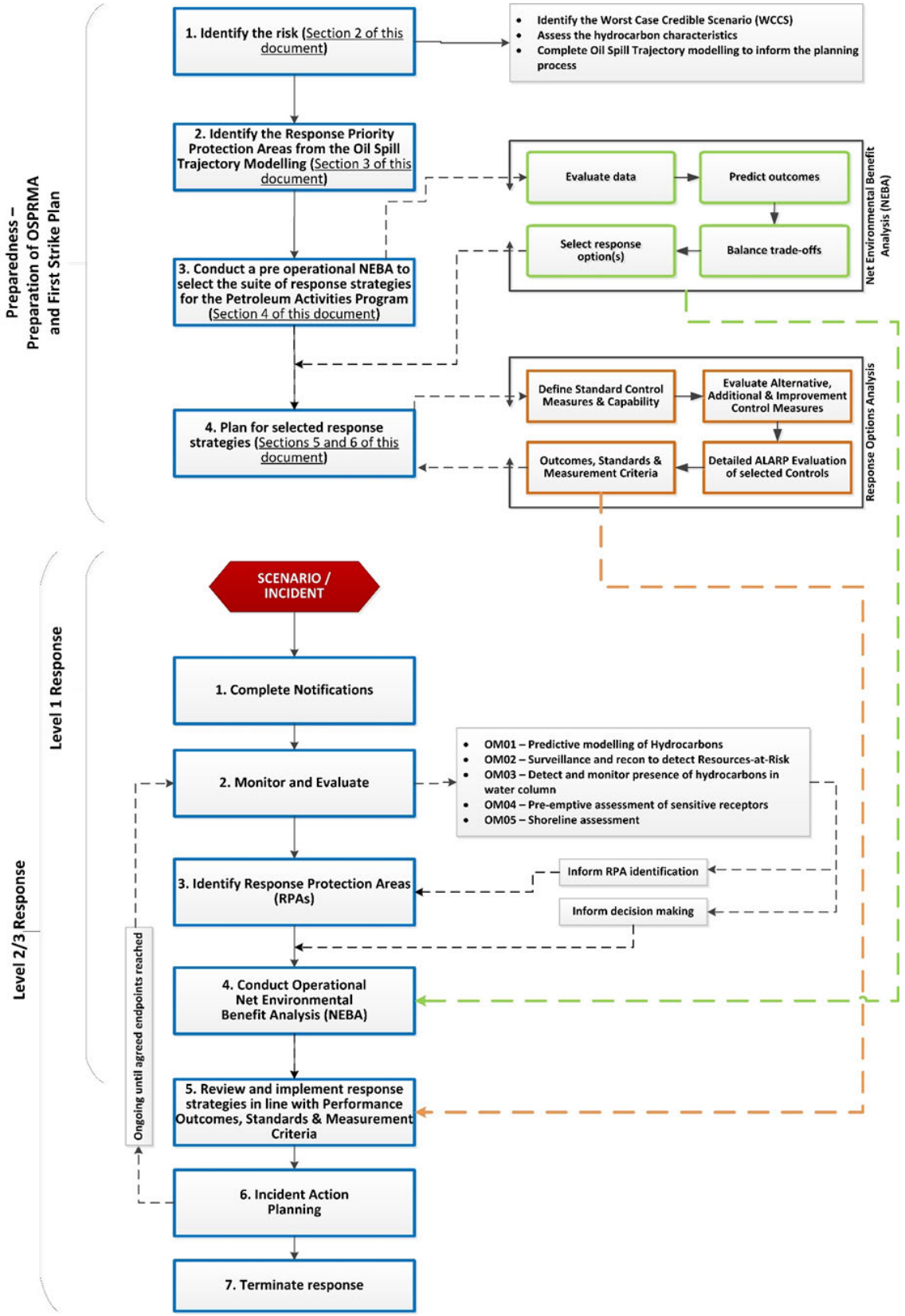

Figure 2-1: Response planning and selection process

2.1 Response planning process outline

This document is expanded below to provide additional context on the key steps in determining capability, evaluating ALARP and hydrocarbon spill response requirements.

Section 1. INTRODUCTION

Section 2. RESPONSE PLANNING PROCESS

- identification of worst-case credible scenario(s) (WCCS)
- spill modelling for WCCS

Section 3. IDENTIFY RESPONSE PROTECTION AREAS

- areas predicted to be contacted at concentration >100 g/m²

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 need
- sets the environmental performance outcomes, environmental performance standards and measurement criteria

Section 6. ALARP EVALUATION

- evaluates alternative, additional, and improved options for each response technique to demonstrate the risk has been reduced to ALARP
- provides a detailed ALARP assessment of selected control measure options against:
  - predicted cost associated with implementing the option
  - predicted change to environmental benefit
  - predicted effectiveness / feasibility of the control measure

Section 7. ENVIRONMENTAL RISK ASSESSMENT OF SELECTED RESPONSE TECHNIQUES

- evaluation of impacts and risks from implementing selected response options

Section 8. ALARP CONCLUSION

Section 9. ACCEPTABILITY CONCLUSION

2.1.1 Response planning assumptions

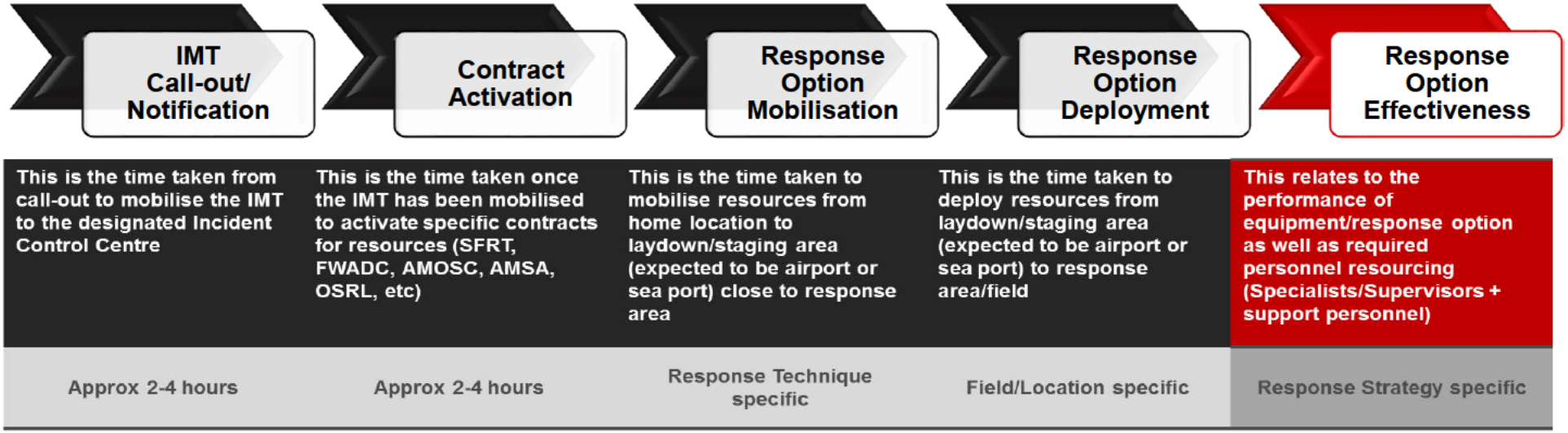

Figure 2-2: Response planning assumption – timing, resourcing and effectiveness

2.2 Environment plan risk assessment (credible spill scenarios)

One potential hydrocarbon release scenario from the PAP has 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. The unplanned event or credible spill scenario for the PAP has been selected as representative across types, sources and incident/response levels, up to and including the worst-case credible scenario (WCCS).

One vessel collision scenario (labelled as Credible Scenario 3 (CS-03) to be consistent with modelling data in modelling report) was modelled and is considered the WCCS for response planning purposes given that it is an instantaneous, surface release of Marine Diesel Oil (MDO). No credible spill scenario is associated with the wellheads.

The location of CS-03 was selected as a worst case location (i.e. closest point to shore) for the WA-28-P permit area and is located approximately 25km southeast of the Eaglehawk-1 wellhead and 25km closer to the WA shoreline than the wellhead location. Modelling of the scenario predicts that the WCCS will not result in shoreline accumulation at response thresholds. The location of CS-03 is shown in Figure 2-3.

Table 2-1 presents credible scenario/WCCS information for the PAP. Response performance measures have been defined based on a response to the WCCS.

Table 2-1: Petroleum Activities Program credible spill scenarios

Credible Scenario No.	Scenario selected for planning purposes	Scenario description	Maximum credible volume released (liquid m^3)[1]	Incident Level	Hydrocarbon (HC) type	Residual proportion	Residual volume (liquid m^3)	Key credible scenarios informing response planning
CS-03 (WCCS)	Yes	An instantaneous hydrocarbon release (MDO) caused by vessel collision[1]	500 m^3	2	MDO	5.0%	25 m^3	Release of 500m^3 of MDO caused by vessel collision

[1] Data was available from a 2018 modelling assessment of a 500m^3 surface release of MDO at the south-eastern corner of the WA-28-P permit area (19° 44' 55.23" S, 116° 20' 04.74" E). The release location used for the spill modelling is located approximately 107km north-east of the Montebello Islands Group and approximately 25 km from the Eaglehawk-1 Wellhead Decommissioning Operation Area (i.e. spill site located closer to West Australian shoreline than the Eaglehawk-1 Exploration Wellhead Operation Area).

The results of the modelling can be used to demonstrate that a spill of the same volume, but closer to sensitive receptors and still within in the vicinity of the Operational Area has an Environment that May Be Affect (EMBA) that is not predicted to include any surface slicks above threshold volumes entering WA state waters, or any shoreline contact or accumulation. Basing the impact assessment for a vessel collision scenario on this modelling is considered reasonable and representative of the spill risk.

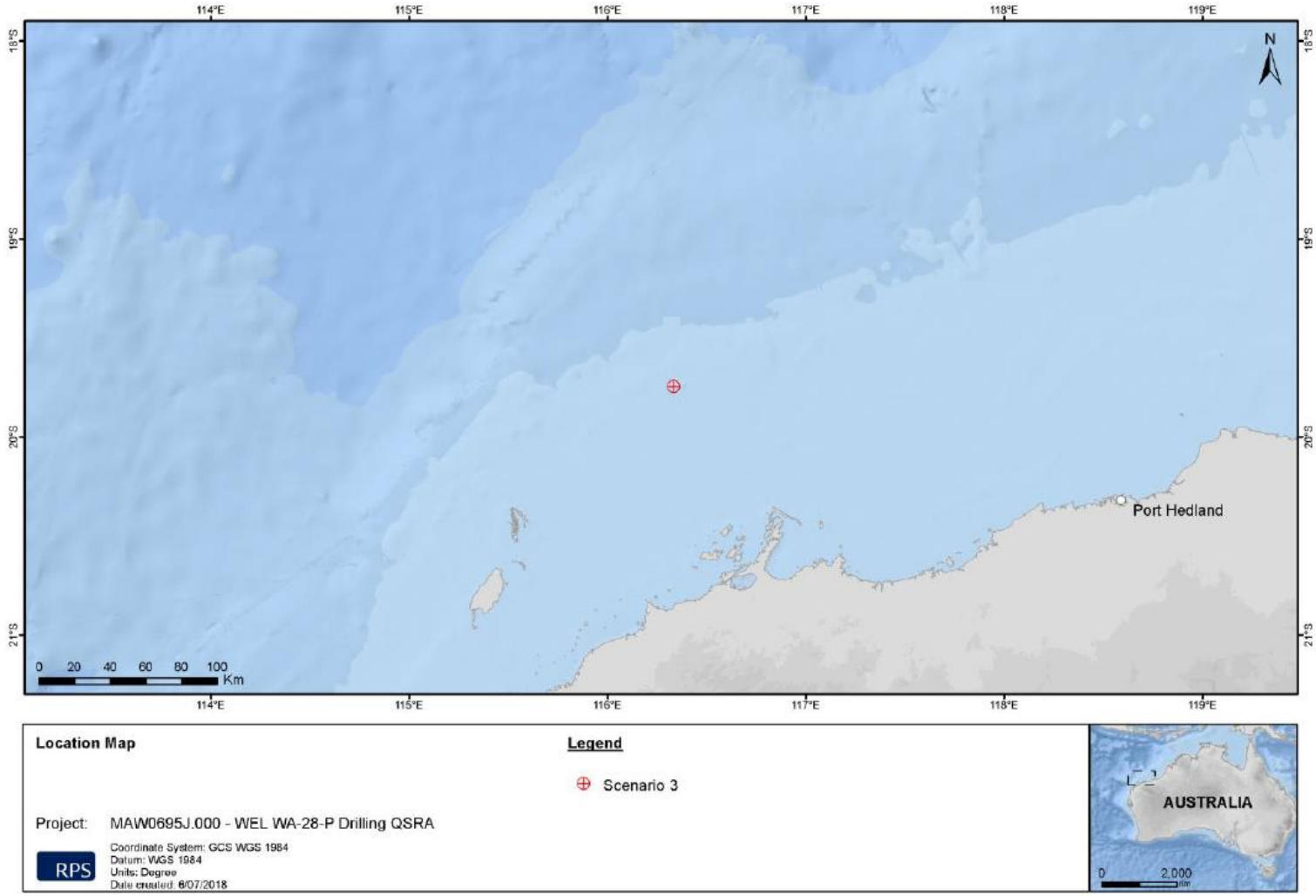

Figure 2-3: Location of Credible Scenario-03 [2]

[2] Note: CS-03 is denoted as Scenario 3 in diagram

2.2.1 Hydrocarbon characteristics

Hydrocarbon characteristics, including modelled weathering data and ecotoxicity, are included in Section 6.7 of the EP.

Diesel

MDO is typically classed as an International Tanker Owners Federation (ITOPF) Group I/II oil. Group I/II oils are non-persistent and tend to dissipate completely through evaporation within a few hours and do not normally form emulsions.

MDO is a mixture of volatile and persistent hydrocarbons with low proportions of highly volatile and residual components. In general, about 6% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); 35% should evaporate within the first 24 hours (180 °C < BP < 265 °C); and 54% should evaporate over several days (265 °C < BP < 380 °C). Approximately 5% of the oil is shown to be persistent. If released in the marine environment and in contact with the atmosphere (i.e. a surface spill), at the modelled sea temperature of 27°C and air temperature of 25°C (which are representative of the conditions in this region), it is predicted that approximately 41% by mass of this oil would 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 tend 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 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 impact that was also used under the United States Oil Pollution Act 1990 Natural Resource Damage Assessment (NRDA) regulations. Notable spills where the model has been used and validated against actual field observations include, Exxon Valdez (French McCay 2004), North Cape Oil Spill (French McCay 2003), along with an assessment of 20 other spills (French McCay and Rowe, 2004). In addition, test spills designed to verify fate, weathering and movement algorithms have been conducted regularly and in a range of climate conditions (French and Rines 1997; French et al. 1997; Payne et al. 2007a and 2007b; French McCay et al. 2007).

Further to this, the algorithms have been updated using the latest findings from the Macondo Well Deepwater Horizon well blowout in the Gulf of Mexico and validated according to the Deepwater Horizon (DWH) oil spill in support of the Natural Resource Damage Assessment (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

Stochastic modelling has been completed for the scenario outlined in Table 2-1. A quantitative, stochastic assessment has been undertaken for the credible spill scenario to help assess the environmental consequences of a hydrocarbon spill.

Stochastic modelling data was available from a 2018 assessment of a 500m^3 surface release of MDO at the south-eastern corner of the WA-28-P permit area. The release location is located approximately 107km north-east of the Montebello Islands Group and approximately 25 km from the Eaglehawk-1 Wellhead Operation Area. The release site is located closer to Western Australian shoreline than the Eaglehawk-1 Operation Area.

The results of the modelling can be used to demonstrate that a spill of the same volume within the same permit area, but closer to sensitive receptors, has an Environment that May Be Affect (EMBA) that is not predicted to include any surface slicks above threshold volumes entering WA state waters, or any shoreline contact or accumulation. Basing the impact assessment for a vessel collision scenario on this modelling is considered reasonable as it reflects a worst-case scenario and still does not predict impacts above response thresholds.

For CS-03 a total of 200 replicate simulations were run over an annual period (50 simulations per quarter). Further details relating to the assessments for the scenarios can be found in Section 6.7 of the EP.

2.3.1.1 Environmental impact thresholds – EMBA and hydrocarbon exposure

The outputs of the stochastic spill modelling are used to assess the potential environmental impact from the credible scenario. 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 4 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 and described in Section 6.7 of the EP.

Table 2-2: Summary of thresholds applied to the stochastic hydrocarbon spill modelling to determine the EMBA and environmental impacts

Threshold (MDO)	Description
10 g/m²	Surface hydrocarbon
100 ppb	Entrained hydrocarbon
50 ppb	Dissolved aromatic hydrocarbon
100 g/m²	Shoreline accumulation

g/m^2 = grams per square metre
ppb = parts per billion

2.3.2 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 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.

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 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.

In the event of an actual response, modelling would be reviewed for suitability and additional modelling would be conducted using real-time data and field information to inform Incident Management Team decisions.

The modelling outputs are presented at response planning thresholds for surface hydrocarbons for the WCCS. Surface spill concentrations are expressed as grams per square metre (g/m^2). The thresholds used are derived from oil spill response planning literature and industry guidance and are summarised in the next subsections.

2.3.3.1 Surface hydrocarbon concentrations

Table 2-3: Surface hydrocarbon thresholds for response planning

Surface hydrocarbon concentration (g/m²)	Description	Bonn Agreement Oil Appearance Code (BAOAC)	Mass per area (g/m²)
>10	Predicted minimum threshold for commencing operational monitoring [3]	Code 3 – Dull metallic colours	5 to 50
50	Predicted minimum floating oil threshold for containment and recovery and surface dispersant application [4]	Code 4 – Discontinuous true oil colour	50 to 200
100	Predicted optimum floating oil threshold for containment and recovery and surface dispersant application	Code 5 – Continuous true oil colour	>200
100	Predicted minimum shoreline accumulation threshold for shoreline assessment operations	Stain	>100
250	Predicted minimum threshold for commencing shoreline clean-up operations	Level 3 – Thin Coating	200 to 1000

The surface thickness of oil at which dispersants are typically effective is approximately 100 g/m². However, substantial variations occur in the thickness of the oil within the slick, and most fresh crude oils spread within a few hours, so that overall the average thickness is 0.1 mm (or approximately 100 g/m²) (ITOPF, 2011). Additionally, the recommended rate of application for surface dispersant is typically one part dispersant to 20 or 25 parts of spilled oil. These figures assume a 0.1 mm slick thickness, averaged over the thickest part of the spill, to calculate a litres/hectare application rate from vessels and aircraft. In practice, this can be difficult to achieve as it is not possible to accurately assess the thickness of the floating oil.

Stochastic modelling confirmed that 41% of hydrocarbons released to the marine environment in CS-03 would be expected to evaporate within the first 24 hours, with a further 54% evaporating over several days. The remaining 5% would be expected to persist in the marine environment until decayed. The volatile nature of Diesel Oil means that the WCCS would not result in hydrocarbon accumulation at a surface thickness at which dispersants would be effective.

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], 2015a).

Guidance from Australian Maritime Safety Authority (AMSA) (AMSA, 2015) indicates that spreading of spills of Group II or III products will rapidly decrease slick thickness over the first 24 hours of a spill resulting in the potential requirement of up to a ten-fold increase in capability on day 2 to achieve the same level of performance.

Further guidance from the European Maritime Safety Authority (EMSA) states that spraying the 'metallic' looking area of an oil slick (Bonn Agreement Oil Appearance Code (BAOAC) 3,

[3] Operational monitoring will be undertaken from the outset of a spill as to 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 Western Australia Department of Transport (WA DoT).

[4] At 50 g/m², 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.

approximately 5 to 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 the National Oceanic and Atmospheric Administration (NOAA) in the United States is found in the document: Characteristics of Response Techniques: 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 that 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 that in terms of oil spill response, sheen can be disregarded as it represents a negligible quantity of oil, cannot be recovered or otherwise dealt with to a significant degree by existing response techniques, and is likely to dissipate readily and naturally (ITOPF, 2014a, 2014b).

Figure 2-4 from AMSA's Identification of Oil on Water – Aerial Observation and Identification Guide (AMSA, 2014) shows expected percent coverage of surface hydrocarbons as a proportion of total surface area. Wind-rows, heavy oil patches and tar balls, for example, must be considered, as they influence oil encounter rates, chemical dosages and ignition potential. Each method has different thickness thresholds for effective response.

From this information and other relevant sources (Allen and Dale, 1996; EMSA, 2012; Spence, 2018) the surface threshold of 50 g/m² was chosen as an average/equilibrium thickness (50 g/m² as an average is 50% coverage of 0.1 mm Bonn Agreement Code 4 – discontinuous true oil colour, or 25% coverage of 0.2 mm Bonn Agreement Code 5 – continuous true oil colour, which would represent small patches of thick oil or wind-rows).

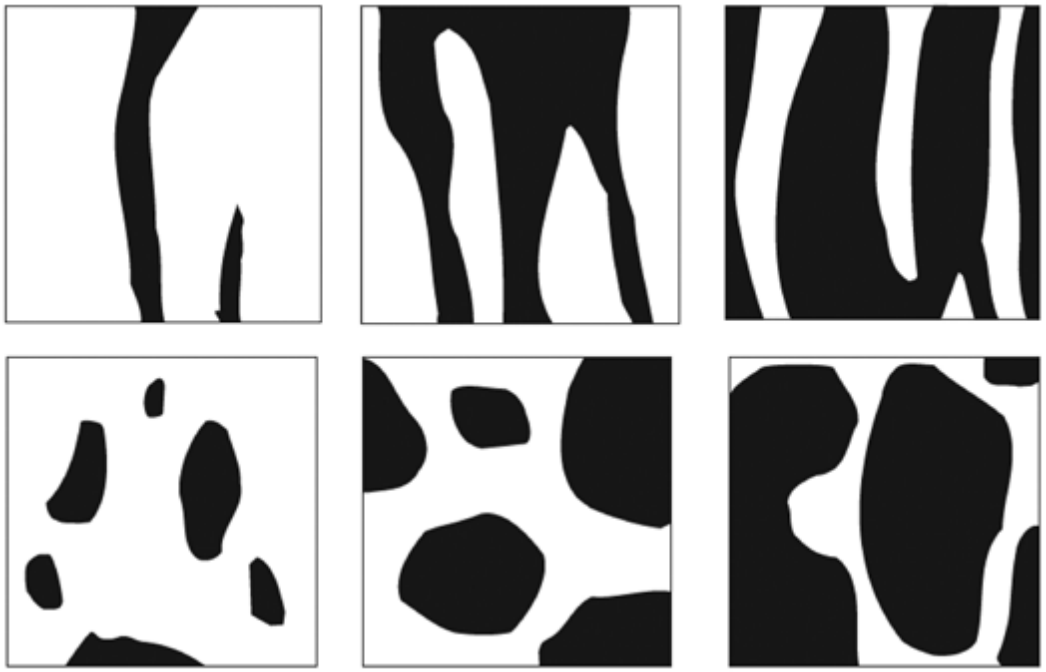

Figure 2-4: Proportion of total area coverage (AMSA, 2014)

Figure 2-5 illustrates the general relationships between on-water response techniques and slick thickness. Wind-rows, heavy oil patches and tar balls, for example, must be considered, as they influence oil encounter rates, chemical dosages and ignition potential. Each method has different thickness thresholds for effective response.

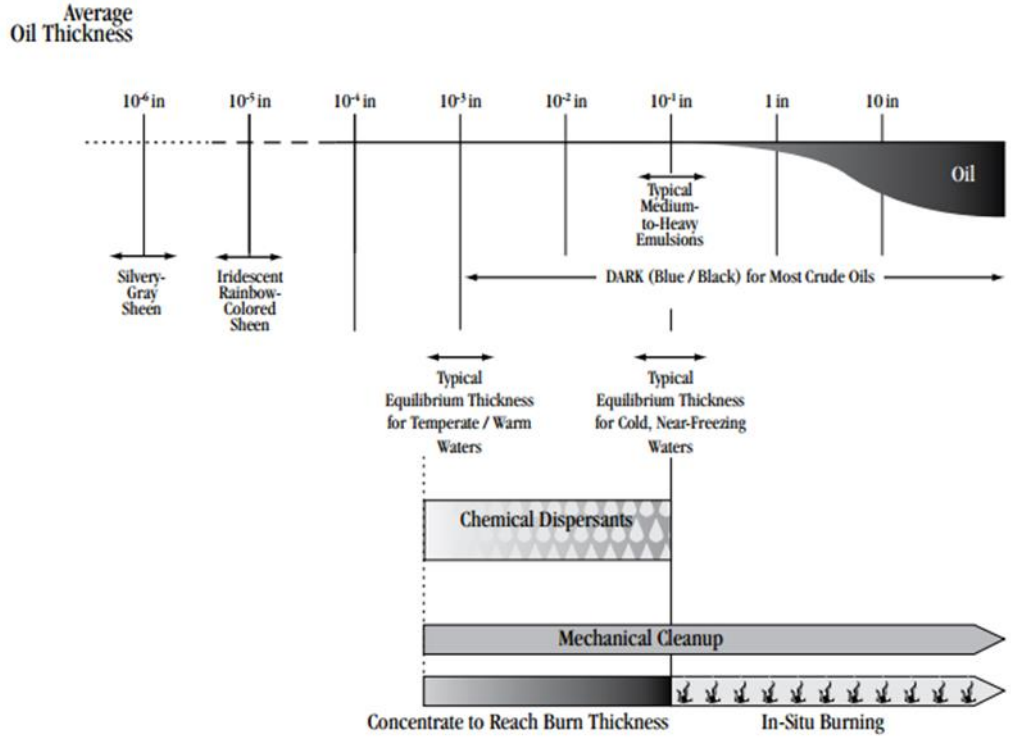

Figure 2-5: Oil thickness versus potential response options (from Allen and Dale, 1996)

Wind and 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 (cSt)	Description	European Maritime Safety Authority	Viscosity at sea temperature (cSt)
5,000*	Predicted optimum viscosity for surface dispersant operations	Generally possible to disperse	500 to 5000
10,000*	Predicted maximum viscosity for effective surface dispersant operations	Sometimes possible to disperse	5,000 to 10,000

* Measured at sea surface temperature

Further to the required thickness for surface dispersant application and containment and recovery to be deployed effectively as outlined above, changes to viscosity will also limit the treatment of offshore response techniques. As outlined in the EMSA Manual on the Applicability of Oil Spill Dispersants (EMSA, 2012), guidance around changes to viscosity and likely effectiveness of surface dispersant application is provided.

This includes the following statements: "*It has been known for many years that it is more difficult to disperse a high viscosity oil than a low or medium viscosity oil. Laboratory testing had shown that the effectiveness of dispersants is related to oil viscosity, being highest for modern "Concentrate, UK Type 2/3" dispersants at an oil viscosity of about 1000 or 2000 mPa.s (1000 to 2000 cSt) and then declining to a low level with an oil viscosity of 10,000 mPa.s (10,000 cSt). It was considered that some generally applicable viscosity limit, such as 2000 or 5000 mPa.s (2000 to 5000 cSt), could be applied to all oils.*"

However, modern oil spill dispersants are generally effective up to an oil viscosity of 5000 mPa.s (5000 cSt) or more, and their performance gradually decreases with increasing viscosity; oils with a viscosity of more than 10,000 are, in most cases, no longer dispersible. Guidance from CEDRE (EMSA, 2012) also indicates that products with a range of 500 to 5000 cSt at sea temperature are generally possible to disperse, while 5000 to 10,000 cSt at sea temperature above pour point are sometimes possible to disperse, with products beyond 10,000 cSt at sea temperature below pour point are generally impossible to disperse.

To support decision making and response planning, a threshold of 10,000 cSt at sea temperature was chosen as a conservative estimate of maximum viscosity for surface dispersant spraying operations.

MDO spill scenario will not reach the 10,000 cSt threshold for the duration of the spill.

2.3.4 Spill modelling results

Details of the scenario and modelling inputs are included in Table 2-5.

Table 2-5: Worst case credible scenario modelling results

Scenario description	Results
Worst-case credible scenario(s) Total volume released	**CS-03** Hydrocarbon release caused by a vessel collision Surface release of 500 m³ of MDO
Worst-case credible scenario Residual volume remaining post-weathering	**CS-03** 5% residual component, 25 m³ of MDO

Scenario description	Results
Stochastic modelling results	
Minimum time to floating hydrocarbon contact with the offshore edge(s) if any shoreline receptor polygon (at a threshold of 10 g/m^2)	No contact at any receptor. Floating oil at 10 g/m^2 present in open waters up to 35 km from spill location
Minimum time to shoreline contact (above 100 g/m²)	NA – stochastic modelling confirmed no shoreline accumulation at or above 100 g/m² under any credible spill scenario
Largest volume ashore at any single RPA (above 100 g/m²)	NA – stochastic modelling confirmed no shoreline accumulation at any RPA at or above 100 g/m² under any credible spill scenario
Largest total shoreline accumulation (above 100 g/m²) all shorelines	NA – stochastic modelling confirmed no shoreline accumulation at any shoreline at or above 100 g/m² under any credible spill scenario
Minimum time to entrained/dissolved hydrocarbon contact with the offshore edges of any receptor polygon (at a threshold of 100 ppb)	51 hours until Montebello Marine Park (MP) is contacted above 100 ppb

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 in Figure 3-1.

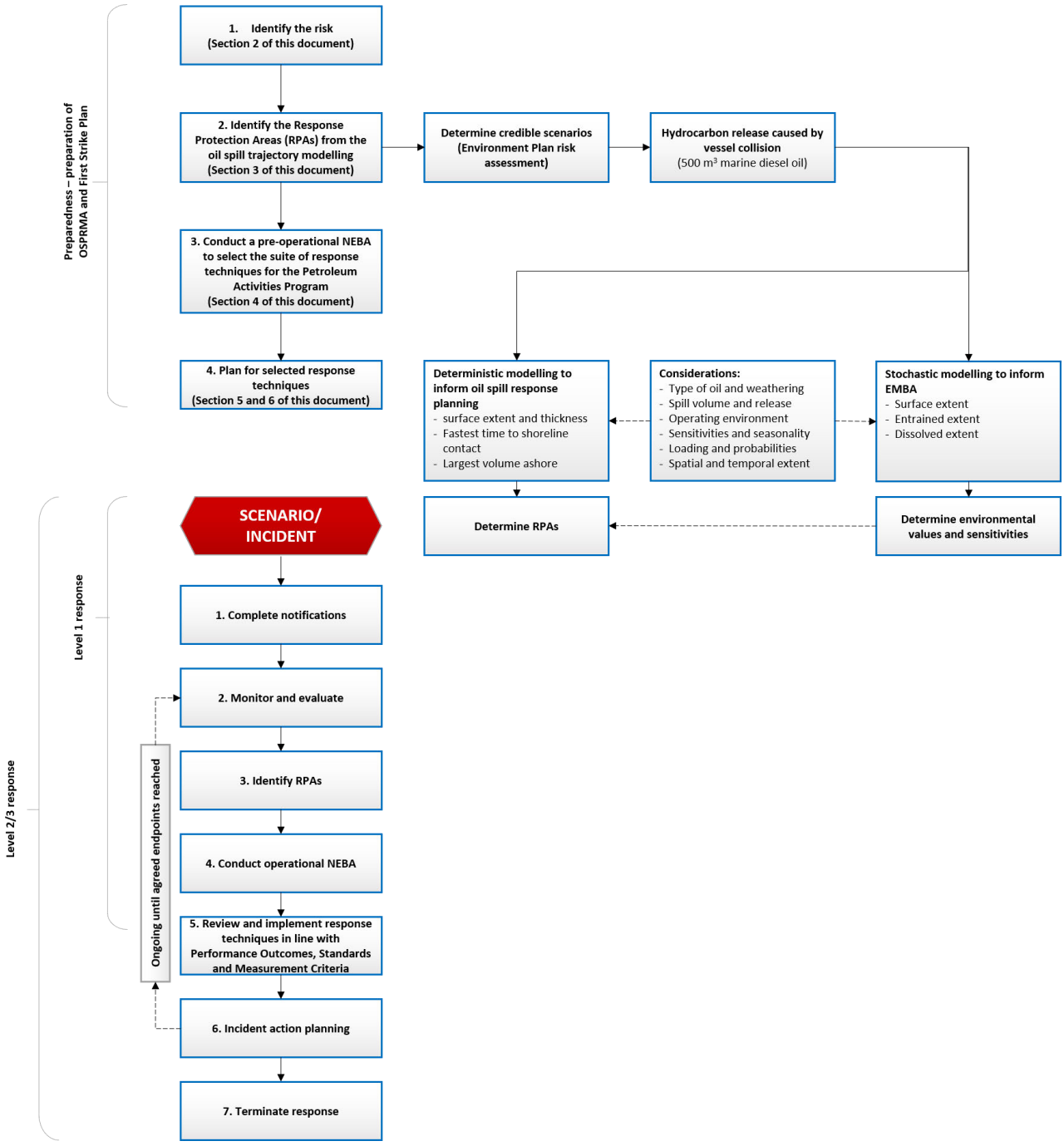

Figure 3-1: Identify response protection areas flowchart

3.1 Identified sensitive receptor locations

Section 4 of the EP includes the list of sensitive receptor locations that have been identified by stochastic modelling as meeting the requirements of:

- receptors with the potential to incur surface, entrained or shoreline accumulation contact above environmental impact thresholds
- receptors within the EMBA which meet:
  - a number of priority protection criteria/categories
  - International Union of Conservation of Nature IUCN marine protected area categories
  - high conservation value habitat and species
  - important socio-economic/heritage value

3.2 Response protection areas

RPAs are selected on the basis of their environmental (ecological, social, economic, cultural and heritage) values and sensitivities and considering the minimum response thresholds (detailed in Section 2.3.3.1) together with the ability to conduct a response.

Based on the stochastic modelling selected for this activity, no contact from floating hydrocarbons above 50 g/m^2 is predicted. Additionally, no shoreline accumulation above 100 g/m^2 is expected and therefore no RPAs are defined for this activity. Operational monitoring will, however, be undertaken from the outset of a spill to assess the nature of the spill, track its location and inform the need for any additional monitoring and/or response techniques. It will also inform if or when the spill enters State Waters and/or control of the incident passes to statutory authorities e.g. WA DoT or AMSA. If operational monitoring does identify RPAs at risk of impact during a real spill event, TRPs for a shoreline response will be drafted in advance for any RPAs with a contact time of <14 days.

Sensitive receptors are presented in the existing environment description and impact assessment section of the EP (Section 4 and Section 6.7 respectively) for the 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.

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 (IPIECA, 2015b).

The NEBA process typically involves the 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.

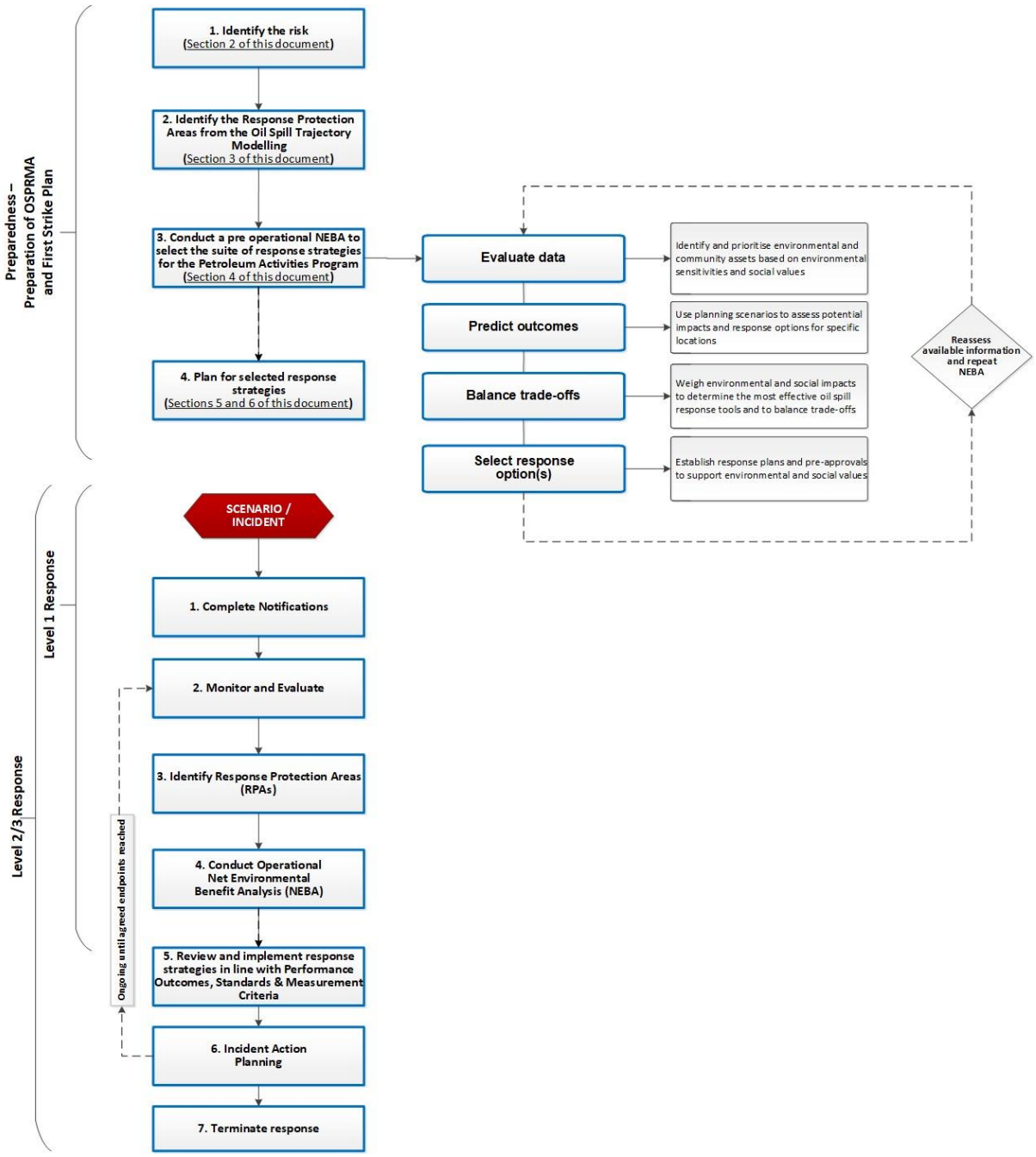

Figure 4-1: Net Environmental Benefit Analysis flowchart

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 stochastic modelling (deterministic modelling not undertaken as stochastic modelling confirmed no shoreline impacts above thresholds).

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 Defining 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 overall WCCS is then used for this pre-operational NEBA. Outlier locations with potential environmental impacts, selected from the stochastic modelling may also be included for assessment. The worst-case MDO release scenario is also analysed to meet regulatory requirements. Response thresholds and modelling are then used to assess the feasibility/effectiveness and scale of the response.

In this circumstance there was no credible scenarios associated with the wellhead so only the worst-case MDO release scenario was assessed. As such, a MDO release from a vessel collision scenario was determined to be the WCCS.

Table 4-1: Scenario summary information

Scenario summary information (CS-03)	
Scenario	Hydrocarbon release caused by a vessel collision - Breach of vessel fuel tank due to collision with third party vessel
Location	Lat: 116°16'41.39" E Long: 19°30'25.04" S *Note: Coordinates provided are for the modelled spill site, located approximately 25 km southeast of the Eaglehawk-1 wellhead and 25 km closer to the WA shoreline than the wellhead location. The results of the modelling data can be used to demonstrate that a spill of the same volume, but closer to sensitive receptors and still within the WA-28-P permit area is a conservative approach and representative of the spill risk*
Oil Type	MDO
Fate and Weathering	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) A further 54% should evaporate over several days (265 °C < BP < 380 °C) 5% is expected to persist in the environment until degradation processes occur
Volume and duration of release	500 m^3 (instantaneous)

4.2.1.1 Hydrocarbon characteristics

Diesel

MDO is classed as an ITOPF Group I/II oil. It is a mixture of volatile and persistent hydrocarbons with high percentage of highly volatile and low percentage of residual components. Evaporation rates will be significant, given the moderate proportion of volatile compounds in the oil (41%). The low-volatility fraction of the oil (54%) will take longer durations of the order of days to evaporate, and the residual fraction of 5% is expected to persist in the environment until degradation processes occur. Considering the spill volume, there is a low potential for dissolution of soluble aromatic compounds. For the reasons described in Sections 2.3.2 and 3.2, together with the above information, deterministic modelling was not undertaken.

4.2.2 Determining potential response options

The available response techniques based on current technology can be summarised under the following headings:

- Monitor and evaluate (including operational monitoring)
- Source control via vessel SOPEP
- Surface dispersant application:
  - aerial dispersant application
  - vessel dispersant application
- Containment and recovery
- In situ burning
- Mechanical dispersion
- 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 (including hazing)

Support functions may include:

- Waste management
- Post spill monitoring/scientific monitoring

An assessment of which response options are feasible for the scenarios is included in Table 4-2. These options are evaluated against the scenario's parameters, including oil type, volume and characteristics, prevailing weather conditions, logistical support, and resource availability to determine their deployment feasibility.

A shortlist of the feasible response options is then carried forward for the ALARP assessment with a justification for the exclusion of other response techniques included in Section 4.2.3. This assessment will typically result in a range of available options, that are deployed at different areas (at-source, offshore, nearshore and onshore) and times through the response. The NEBA process assists in prioritising which options to use where and when and timings throughout the response.

Table 4-2: Response technique evaluation – loss of MDO (vessel collision) (CS-03)

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: MDO				
Monitor and Evaluate	Will be effective in tracking the location of the spill, informing if/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 to assess resources at risk – 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 MDO spill is a feasible response technique and outputs will be used to guide decision making on the use of other monitoring/response techniques and whether the spill passes into State Waters and thus control of the incident moves to WA DoT Monitoring of a MDO spill is a feasible response technique and outputs will be used to guide decision making on the use of other monitoring/response techniques and providing information to regulatory agencies Practicable techniques that could be used for this scenario include OM01, OM02 and OM03. Modelling does not predict impact of any shoreline receptors at threshold, however, OM04 and OM05 would be utilised if any sensitive shoreline receptors are deemed to be at risk of impact	Yes	Monitoring and Evaluation is an essential element of oil spill response and will be necessary to: • validate trajectory and weathering models • determine the behaviour of the diesel in the water • determine the location and state of the slick • provide forecasts of spill trajectory • determine whether the diesel is dispersing naturally or not • determine appropriate response techniques • determine effectiveness of response techniques • confirm impact pathways to receptors Modelling does not predict contact with State Waters but monitoring will be used to confirm if/when the spill crosses into State Waters and thus control of the spill passes to WA DoT
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 is likely to be instantaneous and source control will be limited to what the vessel or facility can safely achieve to prevent further spillage whilst responding to the incident.	Yes	Ability to stop the spill at source will be dependent upon the specific spill circumstances and vessel configuration, 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 MDO as the dispersant droplets tend to pass through the surface films without binding to the hydrocarbon	MDO is prone to rapid spreading and evaporation and is not suitable for surface dispersant application Additionally, modelling of a 500 m^3 spill of MDO for this activity predicts that floating oil will not reach the required minimum threshold of 50 g/m^2 required for surface dispersant to be effective Furthermore, the volatile nature of MDO is also likely to lead to unsafe conditions in the vicinity of fresh hydrocarbon thus this response technique is deemed inappropriate	No	The MDO will rapidly evaporate and disperse naturally. Therefore, application of dispersant would unnecessarily introduce additional chemicals to the marine environment. Any additional entrainment would also increase exposure of subsea species and habitats to hydrocarbons.
Containment and Recovery	Containment and recovery has an effective recovery rate of 5 to 10% when a hydrocarbon encounter rate of 25 to 50% is achieved at BAOAC 4 and 5. It has the potential to reduce the magnitude, probability of, extent of, contact with and accumulation of hydrocarbons on shoreline receptors. It also has the potential to reduce the magnitude and extent of contact with submerged receptors by entrained/dissolved hydrocarbons	MDO is prone to rapid spreading and evaporation and does not tend to form emulsions. Additionally, modelling of a 500 m^3 spill of MDO for this activity predicts that floating oil will not reach the required minimum threshold of 50 g/m^2 required for successful containment and recovery operations Furthermore, the volatile nature of MDO is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon thus this response technique is deemed unsuitable for this activity, particularly with the predicted residue of 25 m^3	No	Containment and recovery would be an inappropriate response technique as it requires the spilled hydrocarbon to be BAOAC 4 or 5 with a 50 to 100% coverage of 100 g/m^2 to 200 g/m^2. Modelling does not predict any surface concentrations above 50 g/m2 and thus this response strategy is not considered feasible
In situ Burning	In situ burning is only effective where minimum slick thickness can be achieved	Use of in situ burning as a response technique for MDO is unfeasible as the minimum slick thickness cannot be attained due to rapid spreading and evaporation. In addition, there is a limited window of opportunity in which this technique can be applied (prior to evaporation of the flammable volatiles) which is unlikely to be achieved Furthermore, entering a volatile environment to undertake this technique would be unsafe for response personnel	No	MDO characteristics are not appropriate for the use of in situ burning and would unnecessarily cause an increase in the release of atmospheric pollutants
Mechanical Dispersion	Mechanical dispersion involves the use of a vessel's propeller wash and/or fire hose to target surface hydrocarbons to encourage/speed up dispersion into the water column	Whilst mechanical dispersion may assist the dissipation of light hydrocarbons, it is unlikely to provide any additional benefit over the natural wind and wave action typically observed in the offshore environment. Furthermore, the volatility of the MDO will make the vicinity of the spill unsafe for response personnel, and the use of vessels within a surface slick will contaminate the vessel and may cause secondary contamination as the vessel transits through unaffected areas	No	No additional benefit over the natural wind and wave action typically observed in the offshore environment. Furthermore, the use of vessels within a surface slick may contaminate the vessel and may cause secondary contamination

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Shoreline Protection and Deflection	Shoreline protection and deflection can be effective at preventing contamination of at-risk areas	Use of shoreline protection and deflection for a spill of MDO is unlikely to provide any significant environmental benefit as the diesel will be subject to rapid spreading and evaporation prior to contact with any sensitive shoreline areas Furthermore, the volatile nature of MDO is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon Operational monitoring will, however, be deployed from the outset of a spill to track the spill location and fate in real-time	No	Stochastic modelling confirmed no shoreline contact at or above response or impact threshold levels. Therefore, protection and deflection would provide no additional environmental benefit
Shoreline Clean-up	Shoreline clean-up is an effective means of hydrocarbon removal from contaminated shorelines. To be optimally effective, a level of 250 g/m² is needed before a realistic shoreline clean-up response can be executed	Use of shoreline clean-up for a spill of MDO is unlikely to provide any significant environmental benefit as the diesel will be subject to rapid spreading and evaporation prior to contact with any sensitive shoreline areas In addition, coverage from MDO on a shoreline would not be high enough to allow effective hydrocarbon removal and the volatile nature of MDO is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon Operational monitoring will, however, be deployed from the outset of a spill to track the spill location and fate in real-time	No	Stochastic modelling confirmed no shoreline contact at or above response or impact threshold levels. Therefore, shoreline cleanup would provide no additional environmental benefit
Oiled Wildlife Response (OWR)	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 fauna from being contaminated and through rehabilitation of fauna already subject to contamination	Due to the likely volatile atmospheric conditions surrounding a MDO spill, response options would be limited to hazing to ensure the safety of response personnel Any rehabilitation of oiled fauna can 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, if fauna is at risk of contamination, oiled wildlife response will be undertaken as and where needed

4.2.3 Exclusion of response techniques

This section discusses the excluded response techniques for the WCCS in Table 4-2 for CS-03.

4.2.3.1 Surface dispersant application

The nature and weathering data indicates that diesel is likely to rapidly spread, thin and evaporate leading to concentrations of surface hydrocarbons that are not conducive to effective surface dispersant application. This is supported by the modelling that shows surface concentrations are not expected to exceed 50g/m^2. Under these circumstances, dispersant droplets tend to pass through the surface films without binding to the hydrocarbon, thus proving ineffective. It would also unnecessarily introduce additional chemical substances to the marine environment and increase exposure of subsea species and habitats to hydrocarbons. These entrained hydrocarbons would likely increase impacts to submerged receptors, such as the Rowley Shoals located approximately 345 km northeast from the spill location.

The volatility of MDO will also make the vicinity of the spill unsafe for response teams.

Modelling has confirmed that shoreline accumulation above threshold levels will not occur under the scenario, therefore surface dispersants would not be effective in preventing shoreline accumulation.

Surface application of dispersants is therefore considered ineffective, with no incremental benefit over natural dispersion.

4.2.3.2 Containment and recovery

Containment and recovery is not an appropriate technique for diesel spills due to rapid spreading and thinning, coupled with high volatility making it subject to high levels of evaporation. This is supported by the modelling that shows surface concentrations are not expected to exceed 50g/m^2. The volatility will also make the vicinity of the spill unsafe for response teams.

Modelling has confirmed that shoreline accumulation above threshold levels will not occur under the scenario, therefore containment and recovery would not be effective in preventing shoreline accumulation.

4.2.3.3 In situ burning

In situ burning requires initial containment operations of the fuel material prior to burning (oil collected to a minimum 3 mm thick layer), which ultimately requires calm sea state conditions (< 20 knot wind speed and waves < 1 to 1.5 m). Due to the sea-state conditions which may regularly exceed these optimum conditions in the vicinity of the Eaglehawk-1 Wellhead Decommissioning Operational Area and the nature of MDO to rapidly spread and thin out, coupled with high volatility of diesel making it subject to high levels of evaporation, in situ burning is not an appropriate technique for diesel spills.

The use of in situ burning would also cause unnecessary atmospheric emissions. Additionally, there are health and safety risks for response personnel associated with the containment and subsequent burning of hydrocarbons. It is also suggested that the residue from attempts to burn would sink, thereby posing an additional risk to the environment. The longer-term effects of burn residues on the marine environment are not fully understood and therefore, no assessment of the potential environmental impact can be determined.

Until further operational and environmental information becomes available, Woodside does not consider in situ burning a viable response option.

4.2.3.4 Mechanical dispersion

Mechanical dispersion involves the use of a vessel's propeller wash and/or fire hose to target surface hydrocarbons to encourage dispersion into the water column. Whilst mechanical dispersion may assist the dissipation of light hydrocarbons it is unlikely to provide any additional benefit over the

natural wind and wave action typically observed in the offshore environment. Furthermore, the volatility of MDO will make the vicinity of the spill unsafe for response personnel, and the use of vessels within a surface slick will contaminate the vessel and may cause secondary contamination as the vessel transits through unaffected areas.

4.2.3.5 Shoreline protection and deflection

Shoreline surface impact above response thresholds of 100 g/m^2, as a result of a hydrocarbon spill modelling conducted for this petroleum activity program, is not expected to occur. Therefore, shoreline protection and deflection is not considered feasible.

4.2.3.6 Shoreline clean-up

Shoreline accumulation above response thresholds of 100 g/m^2, as a result of a hydrocarbon spill modelling conducted for this petroleum activity program is not expected to occur. Therefore, shoreline clean-up is not considered feasible.

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.

As described in Section 2.3.2, stochastic modelling undertaken does not predict any floating or shoreline oil at response thresholds thus deterministic modelling was not undertaken, and stochastic modelling has been used to scale the response.

4.4 Stage 3: Balance trade-offs

Woodside considers environmental impacts and response effectiveness/feasibility to determine the most effective oil spill response tools and balance trade-offs, using an automated NEBA tool. The tool considers potential benefits and impacts associated with a response at sensitive receptors and then considers the effectiveness/feasibility of the response to select the response techniques carried forward to the ALARP assessment. The NEBA can be found in ANNEX A: 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.

Table 4-3: Selection and prioritisation of response techniques

Response planning scenario	Key characteristics for response planning (times are minimum times to contact for first receptor and/or shoreline impact above response threshold)	Feasibility of response techniques									Summary outline of preferred response technique
		Monitor and evaluate	Containment and recovery	Surface dispersant injection	Shoreline protection and deflection	Shoreline clean-up	OWR	In situ burning	Mechanical dispersion	Vessel source control	
CS-03 - Hydrocarbon release caused by a vessel collision (surface): 500 m^3 of MDO released instantaneously (residual component of 25 m^3)	No shoreline receptors are predicted to be impacted by floating oil concentrations at any of the assessed thresholds	Yes	No	No	No	No	Yes	No	No	Yes	Monitor and evaluate Initiate source control if safe and feasible Plan for oiled wildlife response and implement if oiled wildlife is observed

From the NEBA undertaken for loss of MDO through a vessel collision (CS-03), the primary response techniques are:

- Monitor and evaluate
- Vessel source control (SOPEP)
- Oiled wildlife response

Support functions may include:

- Waste management
- Scientific monitoring programme.

5 HYDROCARBON SPILL ALARP PROCESS

Woodside's hydrocarbon spill ALARP process is aligned with guidance provided by NOPSEMA in *Guidance Note GN1488* (2018) and is set out in the 'Woodside Hydrocarbon Spill Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA) Development Guidelines' (Link).

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, or
   - no identified reasonably practicable additional, alternative and/or improved control measures would provide further overall increased proportionate environmental benefit, or
   - no reasonably practical additional, alternative, and/or improved control measures have been identified
3. where an alternative, additional and/or improved control measure is adopted, a measurable level of environmental performance has been assigned
4. higher order impacts/risks have received more comprehensive alternative, additional, and improved control measure evaluations and do not just compare the cost of the adopted control measures to the costs of an extreme or clearly unreasonable control measure
5. cumulative effects have been analysed when considered in combination across the whole activity

The response technique selection is based on the risk assessment conducted in the EP. The risk assessment identifies the type of oil, volume of release, duration of release, predicted fate, weathering and the EMBA (along with other requirements such as time to impact and predicted volumes ashore). Modelling is then used to inform the NEBA and the prioritisation of suitable response options. The scale of the response techniques selected in the pre-operational NEBA is informed through the assessment of results from the 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 Monitor and evaluate (including operational monitoring)

Monitor and evaluate 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.

Table 5-1 provides the operational monitoring plans that support the successful execution of this response technique for this activity.

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 (Link). The proximity of Dampier, Port Hedland, Onslow and Exmouth to the spill event location means that multiple logistical options are available to monitor a spill in relatively short timeframes. The primary mobilisation base for initial monitoring activities would be Dampier. However, in the unlikely event of an extended spill with potential to impact receptors further afield, monitoring activities may also be mobilised from Exmouth, Onslow, Port Hedland 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 if/when the spill has entered State Waters and control of the incident passes to WA DoT. Modelling data for WCCS (CS-03) indicated that concentrations equal to or greater than the 1 g/m^2 and 10 g/m^2 thresholds could potentially be found up to 50 km and 35 km from the spill site, respectively
- Practicable techniques that could be used for this scenario include OM01, OM02 and OM03. Although modelling does not predict impact of any shoreline receptors at threshold values, OM04 and OM05 would be utilised if any sensitive shoreline receptors are deemed to be at risk of impact The time to contact for entrained hydrocarbons greater than 100 ppb is 51 hours at the Montebello MP
- 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 would be instantaneous with response operations extending until the hydrocarbon discharge has ceased, surface hydrocarbons are no longer visible, and no additional response or clean-up of wildlife or habitats is predicted

5.1.2 Environmental performance based on need

Table 5-2: Environmental performance – Monitor and Evaluate

Environmental Performance Outcome		To gather information from multiple sources to establish an accurate common operating picture (COP) 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 5.7)**
1	Oil spill trajectory modelling	1.1	Initial modelling available within six hours using the Rapid Assessment Tool	1, 3B, 3C, 4
		1.2	Detailed modelling available within four hours of RPS Response 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 vessel and ready for deployment 24/7	1, 3A, 3C, 4
		2.2	Deploy tracking buoy from vessel within 2 hours as per the First Strike Plan	1, 3A, 3B, 4
		2.3	Contract in place with service provider to allow data from tracking buoy to be received 24/7 and processed	1, 3B, 3C, 4
		2.4	Data received to be uploaded into Woodside COP daily to improve the accuracy of other monitor and evaluate strategies	1, 3B, 4
3	Satellite imagery	3.1	Contract in place with third-party provider to enable access and analysis of satellite imagery. Imagery source/type requested on activation of service	1, 3C, 4
		3.2	Third-party provider will confirm availability of an initial acquisition within two hours	1, 3B, 3C, 4
		3.3	First image received with 24 hours of Woodside confirming to third-party provider its acceptance of the proposed acquisition plan	1
		3.4	Third-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 monitor and evaluate techniques	1, 3B, 4
		3.6	Satellite Imagery services available and employed during response	1, 3C, 4
4	Aerial surveillance	4.1	Two trained aerial observers available to be deployed by day 1 from resource pool	1, 2, 3B, 3C, 4
		4.2	One aircraft available for two sorties per day, available for the duration of the response from day 1	1, 3C, 4
		4.3	Observer to compile report during flight as per first strike plan. Observers report available to the IMT within two hours of landing after each sortie	1, 2, 3B, 4
5	Hydrocarbon detections in water	5.1	Activate third-party service provider as per first strike plan. Deploy resources within three days: • two specialists in water quality monitoring • two monitoring systems and ancillaries • one vessel for deploying the monitoring systems with a dedicated winch, lifting equipment (i.e. A-frame crane, HIAB crane, etc.) and ancillaries to deploy the equipment	1, 2, 3C, 3D, 4
		5.2	Water monitoring services available and employed during response	1, 3C, 4

Environmental Performance Outcome		To gather information from multiple sources to establish an accurate common operating picture (COP) 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 5.7)**
		5.3	Preliminary results of water sample as per contractor's implementation plan within seven 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 NEBA confirms conventional methods are unsafe or not possible	1, 2, 3C, 4
6	Pre-emptive assessment of sensitive receptors	6.1	10 days prior to any impact predicted by OM01/02/03, and in agreement with WA DoT (for Level 2/3 incidents), deployment of 2 specialists from resource pool in establishing the status of sensitive receptors	1, 2, 3B, 3C, 4
		6.2	Daily reports provided to IMT on the status of the receptors to prioritise RPAs and maximise effective utilisation of resources	1, 3B, 4
7	Shoreline assessment	7.1	10 days prior to any impact predicted by OM01/02/03, and in agreement with WA DoT (for Level 2/3 incidents), deployment of 1 specialist(s) in Shoreline Contamination Assessment Techniques (SCAT) from resource pool for each of the 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 routes with the least environmental impact identified will be selected by a specialist in SCAT operations	1

The control measures and capability of Woodside and its third-party service providers are shown to support Monitor and Evaluate activities up to and including the identified WCCS. This is demonstrated by the following:

- Woodside has a documented, structured and tested capability for Monitor and Evaluate 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 Monitor and Evaluate capability outlined in this section is part of the response developed to manage potential risks and impacts associated with the scenarios to ALARP. There are no further additional, alternative and improved control measures other than those implemented that would provide further benefit.

5.2 Source control via vessel SOPEP

Vessel source control will be conducted, where feasible and in accordance with MARPOL 73/78 Annex I[5], by the Vessel Master under the SOPEP triggered by any loss of containment from the PAP vessels.

The SOPEP provides guidance to the Master and Officers on board the vessel with respect to the extra steps to be taken when an unexpected pollution incident has occurred or is likely to occur. The SOPEP contains all information and operational instructions required by IMO Resolution MEPC.54 (32) adopted on 6 March 1992, as amended by resolution MEPC.86 (44) adopted on 13 March 2000.

Its purpose is to set in motion the necessary actions to stop or minimise oil discharge and mitigate its effects and outlines responsibilities, pollution reporting requirements, procedures and resources needed in the event of a hydrocarbon spill from vessel activities.

In the event of the WCCS vessel collision event, the vessel master may engage precautionary marine manoeuvres to avoid collision or commence pumping operations to transfer MDO and thus minimise the release.

5.2.1 Environmental performance based on need

Woodside has established control measures, environmental performance outcomes, performance standards and measurement criteria to be used for vessel-source oil spill response during the PAP which are detailed in Section 6.7 of the EP. The vessel master's roles and responsibilities are described in EP Section 7.3.

Performance standards for each contracted PAP vessel are detailed in the vessel's specific SOPEP.

These standards ensure that sufficient resources are available and are adequately tested to ensure implementation of the SOPEP in the event of a hydrocarbon spill.

[5] Marpol 73/78 Annex I entry into force in Australia, 2 Oct 1983

5.3 Oiled wildlife response (including hazing)

Woodside would implement a response in accordance with the Oiled Wildlife Operational Plan (Link). This 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 Western Australia Department of Biodiversity, Conservation and Attractions (DBCA) (former Western Australian Department of Parks and Wildlife).

Oiled wildlife response is undertaken in accordance with the Western Australian Oiled Wildlife Response Plan (WA OWRP) to ensure it is conducted in accordance with legislative requirements under the *Animal Welfare Act 2002* (WA).

If there is a net environmental benefit, oiled wildlife operations will be conducted 24 hours per day to reduce the time for rehabilitation and release of oiled wildlife. Hazing and pre-emptive capture techniques to keep non-oiled animals away from contaminated habitat in instances where it is deemed appropriate will be conducted in accordance with the Western Australian Oiled Wildlife Response Plan, specifically vessels used in hazing/pre-emptive capture will approach fauna at slow speeds to ensure animals are not directed towards the oil and deterrence/hazing and pre-emptive capture will only be conducted if Woodside has licensed authority from DBCA and approval from the Incident Controller.

Shoreline access will be considered as part of the operational NEBA. Vehicular access would be restricted on dunes, turtle nesting beaches and in mangroves. Woodside retains specialist personnel to support and manage oiled wildlife operations, including trained and competent responders in Exmouth and Dampier. Additional personnel would be sourced through Woodside's arrangements to support an oiled wildlife response as required.

5.3.1 Response need based on predicted consequence parameters

The following statements identify the key parameters upon which the response need can be based:

- Modelling predicts that no shoreline impact above impact thresholds will occur.
- The offshore location of the release site is expected to initially result in low numbers of at-risk or impacted wildlife.
- It is estimated that an oiled wildlife response would be between Level 1 and 4, as defined in the WA OWRP.

Table 5-3: Key at-risk species potentially in open ocean waters

Species	Open ocean
Marine turtles (including traversing/migrating and/or foraging)	x
Whale sharks	✓
Sea snakes	✓
Seabirds and/or migratory shorebirds	✓
Cetaceans – migratory whales	✓
Cetaceans – dolphins and porpoises	✓
Dugongs	x
Sharks and rays	✓

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. Responding to oiled wildlife consists of eight key stages, as described in Table 5-4.

Table 5-4: Oiled wildlife response stages

Stage	Description
Stage 1: Wildlife first strike response	Gather situational awareness including potential wildlife assets at risk
Stage 2: Mobilisation of wildlife resources	Resources include personnel, equipment and facilities
Stage 3: Wildlife reconnaissance	Reconnaissance to identify potentially affected animals
Stage 4: IAP wildlife sub-plan development	The IAP includes the appropriate response options for oiled wildlife, including wildlife priorities for protection from oiling; deterrence measures (see below); and recovery and treatment of oiled wildlife; resourcing of equipment and personnel It includes consideration of deterrence practices such as 'hazing' to prevent fauna from entering areas potentially contaminated by spilled hydrocarbons, as well as dispersing, displacing or relocating fauna to minimise/prevent contact and provide time for clean-up
Stage 5: Wildlife rescue and staging	This includes the different roles of finding oiled wildlife, capturing wildlife, and holding and/or transportation of wildlife to oiled wildlife facilities
Stage 6: Establishment of an oiled wildlife facility	Treatment facilities would be required for the first-aid, cleaning and rehabilitation of affected animals A vessel-based 'on-water' facility would likely need to be established to enable stabilisation of oiled wildlife before transport to a suitable treatment facility. Suitable staging sites in Exmouth and Dampier have been identified in the draft Regional Oiled Wildlife Response Operational Plan (OWROP), should a land-based site be required
Stage 7: Wildlife rehabilitation	Considerations include a suitable rehabilitation centre and personnel, wildlife housing, record keeping and success tracking
Stage 8: Oiled wildlife response termination	Once a decision has been made to terminate operations, the Incident Controller will stand down individual participating and supporting agencies

Reconnaissance and primary response would be done during operational monitoring and surveillance activities. Where marine fauna are observed on water or transiting near or within the spill area, observations would be recorded through surveillance records.

Staging sites would be established as forward bases for vessel-based field teams. Once recovered to a staging site, wildlife would be transported to the designated oiled wildlife facility or a temporary holding centre (before being transported to the oiled wildlife facility). Temporary holding centres are required when there is significant distance between a staging site and the oiled wildlife facility to enable stabilisation of oiled animals. The oiled wildlife facility is the primary location where animals would be housed and treated. Sites proposed for staging a regional oiled wildlife response in Exmouth and Dampier have been identified.

To deploy a response that is appropriate to the nature and scale of the event, as well as scalable over time, Woodside would implement an oiled wildlife response in consultation with DBCA and use the capability outlined in the WA OWRP, with additional capability if required (e.g. volunteers) accessible through Woodside's *People and Global Capability Surge Labour Requirement Plan*.

The WA OWRP provides indicative oiled wildlife response levels (Table 5-5) and the resources likely to be needed at each increasing level of response.

Table 5-5: Indicative oiled wildlife response level (adapted from the WA OWRP, 2014)

OWR Level	Indicative personnel numbers	Indicative duration	Indicative number of birds (non-threatened species)	Indicative number of birds (threatened species)	Turtles (hatchlings, juveniles, adults)	Cetaceans	Pinnipeds	Dugongs
Level 1	6	< 3 days	1 to 2/day < 5 total	None	None	None	None	None
Level 2	26	> 4 to 14 days	1 to 5/day < 20 total	None	< 20 hatchlings No juv/adults	None	None	None
Level 3	59	> 4 to 14 days	5 to 10/day	1 to 5/day < 10 total	< 50 hatchlings < 5 juv/adults	None	< 5	None
Level 4	77	> 4 to 14 days	5 to 10/day < 200 total	5 to 10/day	< 500 hatchlings < 20 juv/adults	< 5, or known habitats affected	5 to 50	Habitat affected only
Level 5	116	> 4 to 14 days	10 to 100/day > 200 total	10 to 50/day	< 500 hatchlings < 20 juv/adults	< 5 dolphins	> 50	Dugongs oiled
Level 6	122	> 4 to 14 days	> 100/day	10 to 50/day	< 500 hatchlings < 20 juv/adults	> 5 dolphins	> 50	Dugongs oiled

5.3.2 Environmental performance based on need

Table 5-6: Environmental performance – oiled wildlife response

Environmental Performance Outcome		Oiled Wildlife Response is conducted in accordance with the Western Australian Oiled Wildlife Response Plan (WA OWRP) to ensure it is conducted in accordance with legislative requirements to house, release or euthanise fauna under the *Animal Welfare Act 2002* (WA).		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.7)**
8	Wildlife response equipment	8.1	Contracted capability to treat 100 individual fauna for immediate mobilisation	1, 3A, 3B, 3C, 4
		8.2	Contracted capability to treat up to an additional 250 individual fauna within a five-day period	
		8.3	National plan access to additional resources under the guidance of the DoT (up to a Level 3 oiled wildlife response as specified in the OWRP), with the ability to treat about 600 individual fauna by the time hydrocarbons contact the shoreline	1, 3C, 4
		8.4	Vessels used in hazing/pre-emptive capture will approach fauna at slow speeds to ensure animals are not directed towards the hydrocarbons	1, 3A, 3B, 4
		8.5	Facilities for the rehabilitation of oiled wildlife are operational 24/7 as per WA OWRP	1, 3A, 4
9	Wildlife responders	9.1	Two wildlife divisional commanders to lead the oiled wildlife operations who have completed an Oiled Wildlife Response Management course	1, 2, 3B
		9.2	Wildlife responders to be accessed through resource pool and additional agreements with specialist providers	1, 2, 3A, 3B, 3C, 4
		9.3	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
		9.4	Open communication line to be maintained between IMT and infield operations to ensure awareness of progress against plan(s)	1, 3A, 3B

The resulting wildlife response capability has been assessed against the WCCS.

During the surface release the capability available meets the need identified. It indicates that the wildlife response capability has the following expected performance:

- Mobilisation and deployment of approximately two wildlife collection teams by Week one for an open ocean response
- Mobilisation and deployment of one central wildlife treatment and rehabilitation locations at Exmouth or Dampier in accordance with WA OWRP

Wildlife collection operations are not predicted to be required based on modelling results indicating that no shoreline impact at threshold levels will occur. In the event of a spill, one oiled wildlife response team will maintain contact with personnel managing the Monitor and Evaluate response. The oiled wildlife response team will remain on standby for mobilisation and deployment in the event that oiled wildlife are observed.

Woodside would establish a wildlife collection point at the response location for identified oiled wildlife collection and sorting. From these locations, recovered wildlife would be transported to a central treatment location at Exmouth or Dampier.

5.4 Waste management

Waste management is considered a support technique to wildlife response. Waste generated and collected during the response that will require handling, management and disposal may consist of:

- liquids (hydrocarbons and contaminated liquids) collected during wildlife response, and/or
- solids/semi-solids (oily solids, garbage, contaminated materials) collected during wildlife response

Expected waste volumes during an event are likely to vary depending on oil type, volume released, response techniques employed and the weathering properties of the hydrocarbon. 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.

5.4.1 Response need based on predicted consequence parameters

Modelling predicts that there will be no floating oil at recoverable threshold concentrations and no shoreline impact at feasible clean-up threshold concentrations, thus the only waste management consideration will be for oiled wildlife response.

Table 5-7: Response Planning Assumptions – Waste Management

Response planning assumptiopns: Waste management	
Waste loading per m^3 oil recovered (multiplier)	Oiled wildlife response – approximately 1 m^3 of oily liquid waste generated for each wildlife unit cleaned

5.4.2 Environmental performance based on need

Table 5-8: 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 5.7)**
10	Waste management	10.1	Contract with waste management services for transport, removal, treatment and disposal of waste	1, 3A, 3B, 3C, 4
		10.2	Recovered hydrocarbons and wastes will be transferred to licensed treatment facility for reprocessing or disposal	
		10.3	Teams will segregate liquid and solid wastes at the earliest opportunity	
		10.4	Waste management provider support staff available year-round to assist in the event of an incident with waste management as detailed in contract	
		10.5	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
		10.6	Waste management to be conducted in accordance with Australian laws and regulations	1, 3A, 3B, 3C, 4
		10.7	Waste management services available and employed during response	
11	Management of environmental impact of the response risks	11.1	All oiled wildlife response sites zoned and marked before operations commence to prevent secondary contamination and minimise the mixing of clean and oiled waste	1, 3A, 3B

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 that modelling predicts that there will be no floating oil at recoverable threshold concentrations and no shoreline impact at feasible clean-up threshold concentrations, the only waste management requirements will be for oiled wildlife response and the capability available therefore exceeds the need identified.

- Woodside currently has access to service providers committed to providing approximately 120,000 m^3 liquid waste over the duration of the spill
- 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
- 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 activity
- The waste management 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

5.5 Scientific monitoring

A scientific monitoring program (SMP) would be activated following a level two or three unplanned hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors. This would consider receptors at risk (ecological and socio-economic) for the entire predicted Environment that Maybe Affected (EMBA) and in particular, any identified Pre-emptive Baseline Areas (PBAs) for the credible spill scenario or other identified unplanned hydrocarbon releases associated with the operational activities (refer to Table 2-5: PAP worse case credible spill scenarios).

The outputs of the stochastic hydrocarbon spill modelling were used to assess the environmental risk of the hydrocarbon affected area as delineated by the ecological impact EMBA and social-cultural EMBA based on exceedance of environmental and social-cultural hydrocarbon threshold concentrations (refer to Table 2-2, Section 2.3.1.1 and see Section 6 of the EP for further information on applicable thresholds and the EMBA). The Petroleum Activities Program worst-case credible spill CS-03: MDO surface release (short term instantaneous unplanned spill event) defines the EMBA and is the basis of the SMP approach presented in this section.

It should be noted that the resulting SMP receptor locations differ from the Response Protection Areas (RPAs) discussed in Section 3 of this document due to the applicability of different hydrocarbon threshold levels. The SMP would be informed by the data collected via the operational monitoring program (OMP) studies, however, it differs from the OMP in being a long-term program independent of, and not directing, the operational oil spill response or monitoring of impacts from response activities (refer to Section 5.1 Monitor and Evaluate) for the operational monitoring overview.

Key objectives of the Woodside oil spill SMP are:

- Assess the extent, severity and persistence of the environmental impacts from the spill event; and
- Monitor subsequent recovery of impacted key species, habitats and ecosystems.

The SMP comprises ten targeted environmental monitoring programs to assess the condition of a range of physico-chemical (water and sediment) and biological (species and habitats) receptors including Environment Protection and Biodiversity Conservation Act (EPBC Act 1999) listed species, environmental values associated with protected areas and socio-economic values, such as fisheries. The ten SMPs are as follows:

- SM01 - Assessment of the presence, quantity and character of hydrocarbons in marine waters (linked to OM01 to OM03)
- SM02 - Assessment of the presence, quantity and character of hydrocarbons in marine sediments (linked to OM01 and OM05)
- SM03 – Assessment of impacts and recovery of subtidal and intertidal benthos
- SM04 - Assessment of impacts and recovery of mangroves/saltmarsh habitat
- SM05 - Assessment of impacts and recovery of seabird and shorebird populations
- SM06 - Assessment of impacts and recovery of nesting marine turtle populations
- SM07 - Assessment of impacts to pinniped colonies including haul-out site populations
- SM08 - Desktop assessment of impacts to other non-avian marine megafauna
- SM09 - Assessment of impacts and recovery of marine fish (linked to SM03)
- SM10 - Assessment of physiological impacts to important fish and shellfish species (fish health and seafood quality/safety) and recovery.

These SMPs have been designed to cover all key tropical and temperate habitats and species within Australian waters and broader, if required. A planning area for scientific monitoring is also identified to acknowledge potential hydrocarbon contact below the environmental threshold concentrations and beyond the EMBA. This planning area has been set with reference to the entrained low exposure value of 10 ppb detailed in the NOPSEMA Bulletin #1 Oil Spill Modelling (2019), as shown in **Figure** 5-1:

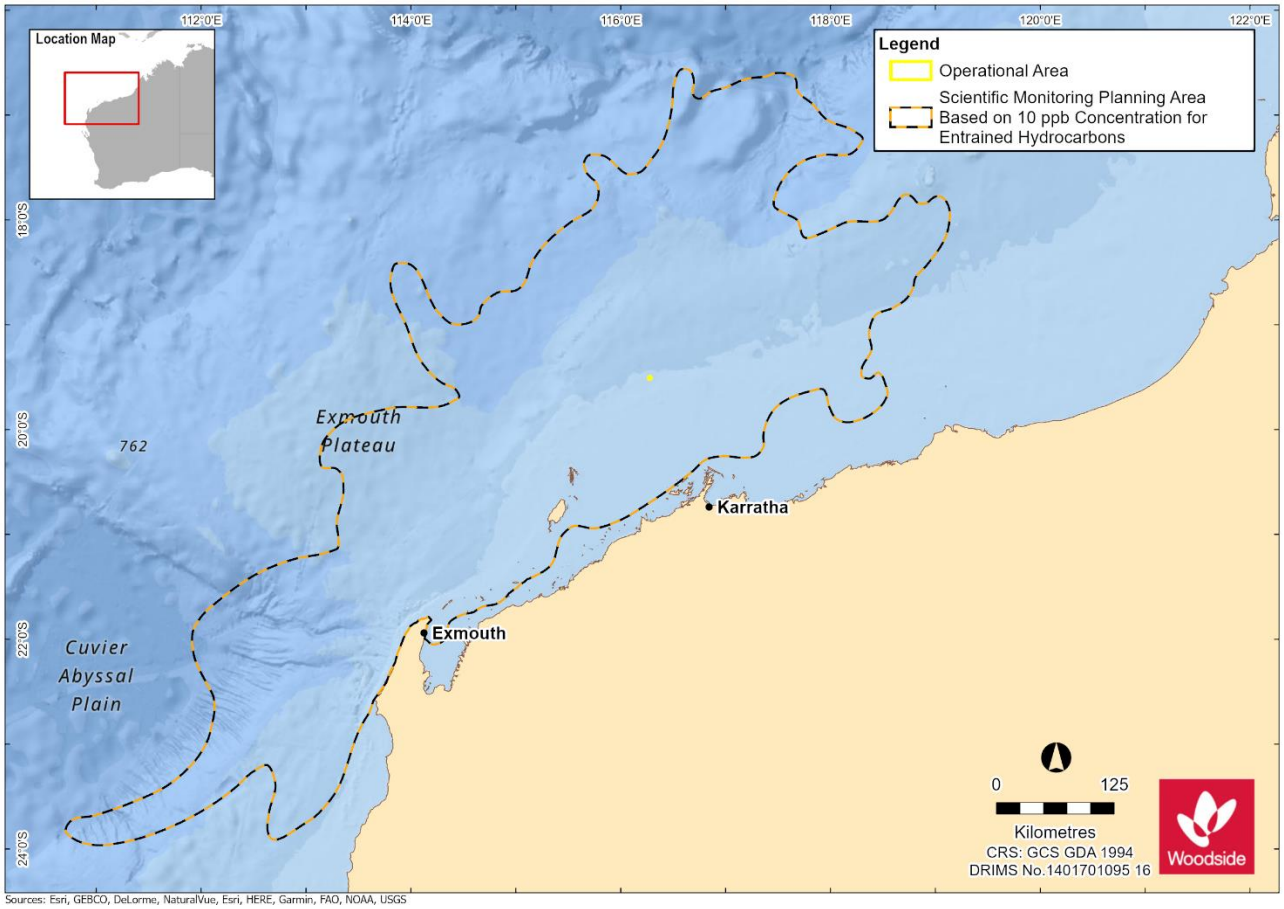

Figure 5-1: The planning area for scientific monitoring based on the area potentially contacted by the low (below ecological impact) entrained hydrocarbon threshold of 100 ppb in the event of the worst-case credible spill scenario (CS-03: MDO surface release).

NOTE: Figure 5-1 represents the overall combined extent of the MDO spill model outputs based on a total of 200 replicate simulations over an annual period for the worst case credible scenario and therefore represents the largest spatial boundaries of the hydrocarbon spill combinations, not the spatial extent of a single hydrocarbon spill.

5.5.1 Scientific monitoring deployment considerations

Scientific Monitoring Deployment Considerations	
Existing baseline studies for sensitive receptor locations predicted to be affected by a spill	PBAs of the following two categories: • PBAs within the predicted <10-day hydrocarbon contact time prediction: As part of this assessment, the approach was to conduct a desktop review of available and appropriate baseline data for key receptors for locations (if any) that are potentially impacted within ten days of a spill (based on the EMBA). Then investigate the need to conduct baseline data collection to address data gaps and demonstrate spill response preparedness (refer to Annex D). In the scenario, that baseline data needs are identified, planning for baseline data acquisition is typically commenced pre-PAP and execution of studies undertaken with consideration of weather, receptor type, seasonality and temporal assessment requirements. • PBAs >10 days' time to predicted hydrocarbon contact in the event of an unplanned hydrocarbon release (from the operational activities). 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 5.5.2). SMP activation (as per the Eaglehawk-1 Wellhead Decommissioning FSP) directs the SMP team to follow the steps outlined in the SMP Operational Plan. The steps include: checking the availability and type of existing baseline data, with particular reference to any PBAs identified as >10 days to hydrocarbon contact. Such information is used to identify response phase PBAs and plan for the activation of SMPs for pre-emptive (i.e. pre-hydrocarbon contact) baseline assessment.
Pre-emptive Baseline in the event of a spill	Activation of SMPs in order to collect baseline data at sensitive receptor locations with predicted hydrocarbon contact time >10 days (as documented in ANNEX C).
Survey platform suitability and availability	In the event of the SMP activation, suitable survey platforms are available and can support the range of equipment and data collection methodologies to be implemented in nearshore and offshore marine environments.
Trained personnel to implement SMPs	Access to trained personnel and the sampling equipment contracted for scientific monitoring via a dedicated scientific monitoring program standby contract.
Met-ocean conditions	The following met-ocean conditions have been identified to implement SMPs: • Waves <one 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.

5.5.2 Response planning assumptions

Response Planning Assumptions	
PBAs	PBAs identified through the application of defined hydrocarbon impact thresholds during the Quantitative Spill Risk Assessment process and a consideration of the minimum time to contact at receptor locations fall into two categories: • PBAs (≤ 10 days minimum time to contact) for which baseline data are planned for and data collection may commence pre-PAP, where identified as a gap. • PBAs (> 10 days minimum time to contact) for which baseline data may be collected in the event of an unplanned hydrocarbon release. Response phase PBAs are prioritised for SMP activities due to vulnerability (i.e. time to contact and environmental sensitivity) to potential impacts from hydrocarbon contact and an identified need to acquire baseline data. Time to hydrocarbon contact of >10 days has been identified as a minimum timeframe within which it is feasible to plan and mobilise applicable SMPs and commence collection of baseline (pre-hydrocarbon contact) data, in the event of an unplanned hydrocarbon release from the Eaglehawk-1 Wellhead Decommissioning Operations. PBAs for the Eaglehawk-1 Wellhead Decommissioning Operations identified and listed in ANNEX D, Table D-1. The PBAs together with the situational awareness (from the operational monitoring) are the basis for the response phase SMP planning and implementation.
Pre-spill	A review of existing baseline data for receptor locations with potential to be contacted by floating or entrained hydrocarbons at environmental thresholds within ≤10 days has identified the following: • Glomar Shoal • Rankin Bank [6] • Barrow Island, Montebello Islands Group, Lowendal Islands Groups and state marine parks • Southern Pilbara Island Group For example, adequate baseline data are available for Rankin Bank and Glomar Shoal as last surveyed (benthic communities and fish assemblages) in November 2018 (Currey-Randall et al., 2019). Australian Marine Parks (AMPs) potentially affected includes: • Montebello AMP All the Australian Marine Parks (AMPs) are located in offshore waters where hydrocarbon exposure is possible on surface waters and in the upper layers of the water column.

[6] Floating oil will not accumulate on submerged features and at open ocean locations, therefore, no surface contact will occur and only entrained hydrocarbon contact is predicted at Rankin Bank and Glomar Shoal ≤10 days.

Response Planning Assumptions	
in the event of a spill	Locations with >10 days to hydrocarbon contact, as well as the wider area, will be investigated and identified by the SMP team (in the Environment Unit of the Incident Control Centre (ICC)) 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). Based on the PAP worst case credible spill CS-03 (Table 2-5), The full list of contacted sensitive receptors are presented in ANNEX D, based on the PAP worst case credible spill CS-03 (Table 2-5Table 2-1). To address the initial focus in a response phase SMP planning situation, receptor locations predicted to be contacted between >10 days and 20 days have been identified as follows: • Muiron Islands [7] • Ningaloo AMP • Gascoyne AMP • Argo-Rowley Terrace AMP In the event key receptors within geographic locations that are potentially impacted after 10 days following a spill event or commencement of the spill, and where adequate and appropriate baseline data are not available, there will be 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). • Highly sensitive and/or valued habitats and communities in coastal waters will be prioritised for pre-emptive baseline surveys over open water areas of AMPs e.g. Ningaloo coast. • Collect baseline data for receptors predicted to be outside the spill affected area so reference datasets for comparative analysis with impacted receptor types can be assessed post-spill.
Baseline Data	A summary of the spill affected area and receptor locations as defined by the EMBAs for the PAP worst case credible spill CS-03 (Table 2-5), is presented in the Eaglehawk-1 Wellhead Decommissioning EP (refer to Section 6 of the EP). The key receptors at risk by location and corresponding SMPs based on the EMBA for the PAP are presented in ANNEX D, as per the PAP worse case credible spill scenario. This matrix maps the receptors at risk with their location and the applicable SMPs that may be triggered in the event of a Level two or three hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors. Receptor locations and applicable SMPs are colour coded to highlight possible time to contact based on receptor locations identified as PBAs. The status of baseline studies relevant to the PAP are tracked by Woodside through the maintenance of a Corporate Environment Environmental Baseline Database (managed by the Woodside Environmental Science team), as well as accessing external databases such as the Department of Water and Environmental Regulation (WA) Index of Marine Surveys for Assessment (IMSA) [8] (refer to ANNEX C: Oil Spill Scientific Monitoring Program).

5.5.3 Summary – scientific monitoring

The resulting scientific monitoring capability has been assessed against the PAP worst case credible spill scenario. The range of strategies provide an ongoing approach to monitoring operations to assess and evaluate the scale and extent of impacts. All known reasonably practicable control measures have been adopted with the cost and organisational complexity of these options determined to be moderate and the overall delivery effectiveness determined to be medium. The SMP's main objectives can be met, with no additional, alternative or improved control measures providing further benefit.

[7] Muiron islands includes the WHA and Marine Management Area
[8] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

5.5.4 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.

Receptor locations of interest for the SMP during the response phase are:

- Ningaloo Coast,
- Muiron Islands
- Barrow Island, Montebello Islands Group and Lowendal Islands Group
- South Pilbara Islands

Documented baseline studies are available for certain sensitive receptor locations including: Adequate baseline data are available for Rankin Bank and Glomar Shoal as last surveyed (benthic communities and fish assemblages) in November 2018 (Currey-Randall et al., 2019) and the Ningaloo Coast and Muiron Islands (ANNEX D, Table D-2). The SMP approach in the response phase would still deploy SMP teams to maximise the opportunity to collect pre-emptive baseline data at sensitive receptor locations, i.e., the sections of the Ningaloo Coast not immediately contacted to hydrocarbons. As the exact locations where hydrocarbon contact occurs may be unpredictable, SM01 would be mobilised as a priority to be able to detect hydrocarbons and track the leading edge of the spill to verify where hydrocarbon contact occurs which will assist with where SMP resources are a priority need to obtain pre-emptive baseline data.

The option analysis in Section 6.5 considers ways to reduce the gap by considering alternate, additional, and/or improved control measures on each selected response strategy.

5.5.5 Environmental performance based on need

Table 5-7: 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**	
12	• Woodside has an established and dedicated SMP team comprising the Environmental Science Team and additional Environment Advisers within the Health, Safety Environment (HSE) Function.	12.1	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.
13	• 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.	13.1	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.
14	• 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 ICC) 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 containment response. • SMP Team structure, interface with SMP standby contractor and linkage to the ICC 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 Australasian Inter-Service Incident Management System (AIIMS) framework utilised in Australia. • Woodside utilises an online Incident Management System (IMS) 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 FSP. • Step by step process to activation of individual SMPs provided in the SMP Operational Plan. • All decisions made regarding SMP logged in the online IMS (SMP team members trained in using Woodside's online Incident Management System). • SMP component input to the ICC IAP as per the identified ICC timed sessions and the SMP IAP logged on the online IMS. • Woodside Environmental Science Team provides awareness training on the activation and stand-up of the Scientific Monitoring Programme (SMP) for the Environment Advisers in Woodside who are listed on the SMP team on an annual basis. • Woodside Environmental Science Team provides annual awareness training on the activation and stand-up of the Scientific Monitoring Program (SMP) for the SMP Standby provider. • Woodside Environmental Science Team co-ordinates an annual SMP arrangement testing exercise performed by the SMP standby contractor. SMP standby contractor and the SMP arrangements (people and equipment availability) tested annually since 2016.	14.1	• 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.

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**	
15	• Chartered and mutual aid vessels. • Suitable vessels would be secured from the Woodside support vessels, regional fleet of vessels operated by Woodside and other operators and the regional charter market. • Vessel suitability will be guided by the need to be equipped to operate grab samplers, drop camera systems and water sampling equipment (the individual vessel requirements are outlined in the relevant SMP methodologies (refer to Table C-2, ANNEX C). • Nearshore mainland waters could use the same approach as for open water. Smaller vessels may be used where available and appropriate. Suitable vehicles and machinery for onshore access to nearshore SMP locations would be provided by Woodside's transport services contract and sourced from the wider market. • Dedicated survey equipment requirements for scientific monitoring range from remote towed video and drop camera systems to capture seabed images of benthic communities to intertidal/onshore surveying tools such as quadrats, theodolites and spades/trowels, cameras and binoculars (specific survey equipment requirements are outlined in the relevant SMP methodologies (refer to Table C-2, ANNEX C)). Equipment would be sourced through the existing SMP standby contract with 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.	15.1	Woodside maintains standby SMP capability to mobilise equipment required to conduct scientific monitoring programs SM01 – SM10 (except desktop based SM08): • Equipment is sourced through the existing standby contract with Standby SMP standby contractor, as detailed within the SMP Implementation Plan.	• Hydrocarbon Spill Preparedness Team Internal Control Environment tracks the quarterly review of the Oil Spill Contracts Master. • SMP standby monthly resource reports of equipment availability provided by SMP contractor (SMP resourcing report register). • SMP annual arrangement testing and reporting.
16	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) [9] (refer to ANNEX C: Oil Spill Scientific Monitoring Program).	16.1	• Annual reviews of environmental baseline data. • PAP specific Pre-emptive Baseline Area baseline gap analysis.	• Annual review/update of Woodside Baseline Environmental Studies Database. • Desktop review to assess the environmental baseline study gaps completed prior to EP submission. • Accessing baseline knowledge via the SMP annual arrangement testing.

Environmental Performance Outcome		SMP plan to acquire response phase monitoring targeting pre-emptive baseline data achieved		
Control measure		**Performance Standard**	**Measurement Criteria**	
17	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.	17.1	**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 ICC) contribute SMP component of the ICC Planning Function in development of the IAP.	• Response SMP plan. • Woodside's online Incident Management System Records. • SMP component of the Incident Action Plan (IAPs).

[9] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

		17.2	**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**	
18	• 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 Incident Action Plan (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.	18.1	**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.
		18.2	**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.
		18.3	**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 scientific monitoring (Figure C-3 of ANNEX C):	Evidence of Termination Criteria triggered: • Documentation and approval by relevant stakeholders to end SMPs for specific receptor types.

5.6 Incident management system

The Incident Management System (IMS) 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.

5.6.1 Incident action planning

The ICC will be required to collect and interpret information from the scene of the incident to determine support requirements to the site-based IMT, develop an incident action plan (IAP) and assist the IMT with the execution of that plan. The site-based IC may request the ICC to complete notifications internally within Woodside, to stakeholders and government agencies as required. Depending on the type and scale of the incident either the ICC 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.

5.6.2 Operational NEBA process

In the event of a response, Woodside will confirm that the response techniques adopted at the time of Environment Plan/Oil Pollution Emergency Plan (EP/OPEP) acceptance remain appropriate to reduce the consequences of the spill. This process verifies that there is a continuing net environmental benefit associated with continuing the response technique through the operational NEBA process. The process also 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 the response and the response activity. For example, if vessels are required for access to nearshore or onshore areas, anchoring locations will be selected to minimise disturbance to benthic habitats. Vessel cleanliness would be commensurate with the receiving environment. The operational NEBA will consider the risks and benefits of conducting other response techniques.

The operational NEBA process is also used to terminate a response. Using data from operational and scientific monitoring activities, the response to a hydrocarbon spill will be terminated in accordance with the termination process outlined in the Oil Pollution Emergency Arrangements (Australia). In effect the operational NEBA will determine whether there is a net environmental benefit to continue response operations.

5.6.3 Stakeholder engagement process

Woodside will ensure stakeholders are engaged during the spill response in accordance with internal standards. This process requires that Woodside will:

- Undertake all required notifications (including Aboriginal and Torres Strait Islander traditional landowners and government notifications) for stakeholders in the region (identified in the First-Strike Response Plan). This includes notification to mariners to communicate navigational hazards introduced through response equipment and personnel
- In the event of a response, identify and engage with relevant stakeholders and continually assess and review

5.6.4 Environmental performance based on need

Table 5-8: 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 5.7)**
19	Operational NEBA	19.1	Confirm that the response techniques adopted at the time of acceptance remain appropriate to reduce the consequences of the spill within 24 hours	1, 3A
		19.2	Record the evidence and justification for any deviation from the planned response activities	
		19.3	Record the information and data from operational and scientific monitoring activities used to inform the NEBA	
20	Stakeholder engagement	20.1	Prompt and record that all notifications (including government notifications) for stakeholders in the region are made	
		20.2	In the event of a response, identification of relevant stakeholders will be re-assessed throughout the response period	
		20.3	Undertake communications in accordance with: • Woodside Crisis Management Functional Support Team Guideline – Reputation • External Communication and Continuous Disclosure Procedure • External Stakeholder Engagement Procedure	
21	Personnel required to support any response	21.1	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	1, 3B
		21.2	A duty roster of trained and competent people will be maintained to ensure that minimum manning requirements are met all year round	3C
		21.3	Immediately activate the IMT with personnel filling one or more of the following roles: • Operations Duty Manager • D&C Duty Manager • Operations Coordinator • Deputy Operations Coordinator • Planning Coordinator • Logistics (materials, aviation, marine and support positions) • Management Support • Health and Safety Advisor • Environment Duty Manager • People Coordinator • Public Information Coordinator • Intelligence Coordinator • Finance Coordinator	1, 2, 3B, 3C, 4
		21.4	Collect and interpret information from the scene of the incident to determine support requirements to the site-based IMT, develop an Incident Action Plan (IAP) and assist with the execution of that plan	
		21.5	Security and Emergency management (S&EM) advisors will be integrated into ICC 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 5.7)**
		21.6	Continually communicate the status of the spill and support Woodside to determine the most appropriate response by delivering on the responsibilities of their role	
		21.7	Follow the OPEA, Operational Plans, FSPs, support plans and the IAPs developed	1, 2, 3A, 4
		21.8	Contribute to Woodside's response in accordance with the aims and objectives set by the Duty Manager	1, 2, 3B, 3C, 4

5.7 Measurement criteria for all response techniques

Woodside ensures compliance with environmental performance outcomes and standards through four primary mechanisms. The aforementioned performance tables identify which of these four mechanisms monitors the readiness and records the effectiveness and performance of the control measures adopted.

5.7.1 The Incident Management System

The IMS supports the implementation of the Emergency and Crisis Management Procedure. The IMS provides a near real-time, single source of information for monitoring and recording an incident and measuring the performance of those control measures.

The Emergency and Crisis Management Procedure defines the management framework, including roles and responsibilities, to be applied to any size incident (including hydrocarbon spills). The organisational structure required to manage an incident is developed in a modular fashion and is based on the specific requirements of each incident. The structure can be scaled up or down.

The Incident Action Plan (IAP) process formally documents and communicated the:

- incident objectives
- status of assets
- operational period objectives
- response techniques (defined during response planning)
- 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.

5.7.2 The S&EM Competency Dashboard

The S&EM competency dashboard records the number of trained and competent responders that are available across Woodside, and some external providers, to participate in a response.

This number varies 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
- Australian Marine Oil Spill Centre (AMOSC) core group
- AMOSC
- Oil Spill Response Limited (OSRL)
- Marine Spill Response Corporation (MSRC)
- AMSA
- Woodside contracted workforce

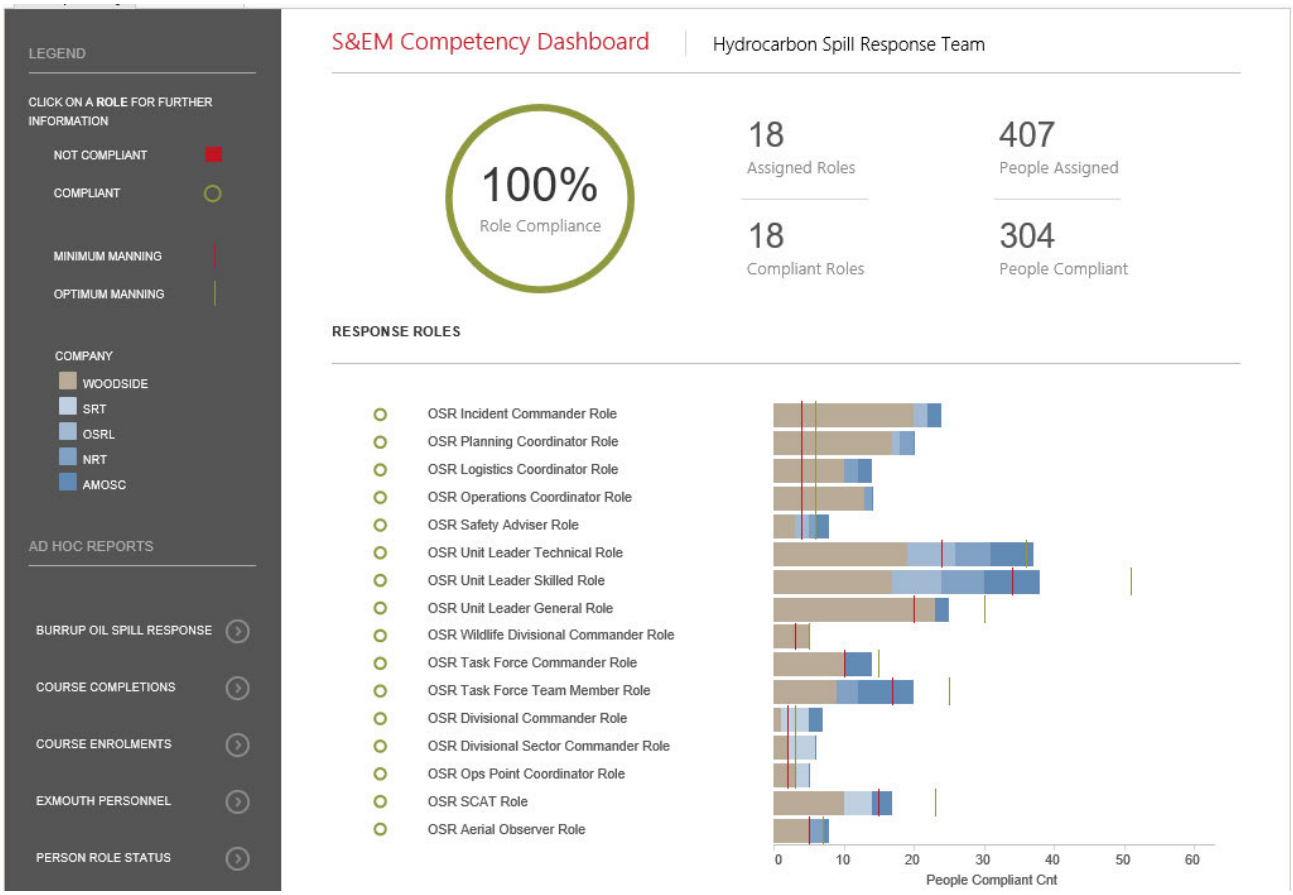

Figure 5-2: Example screen shot of the HSP competency dashboard

The Dashboard is one of Woodside's key means of monitoring its readiness to respond. It also shows that Woodside can meet the requirements of the environmental performance standard that relate to filling certain response roles.

Figure 5-3 shows deeper dive into the Ops Point Coordinator role and the training modules required to show competence.

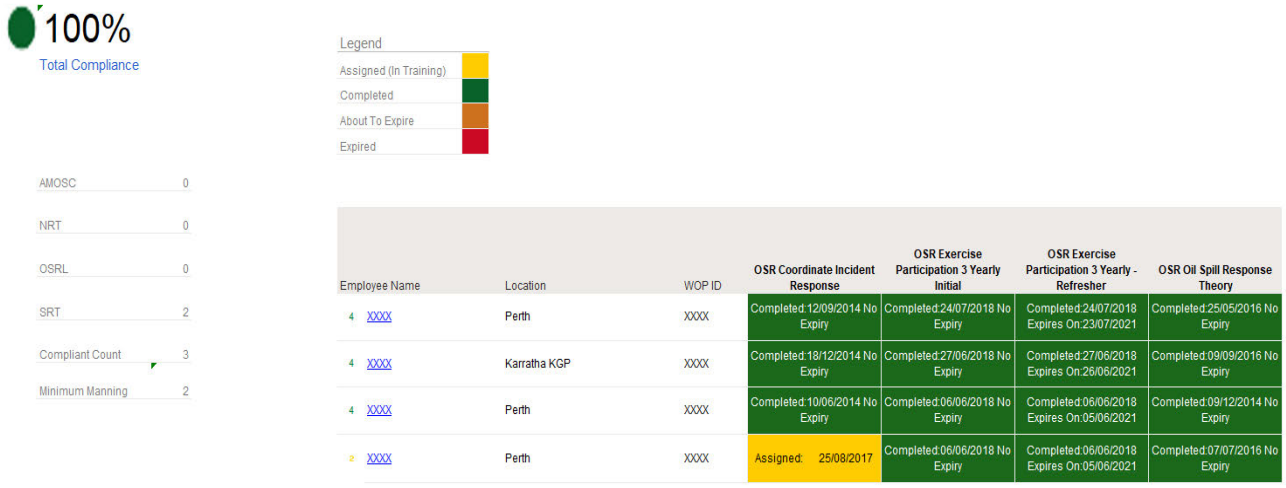

Figure 5-3: Example screenshot for the Ops Point Coordinator role

5.7.3 The Hydrocarbon Spill Preparedness ICE Process

The Hydrocarbon Spill Response Team has developed a Hydrocarbon Spill Preparedness Internal Control Environment (ICE) assurance 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, i.e Oil Pollution Emergency Arrangements, first strike plans, operational plans, support plans and tactical response plans, are current and in line with regulatory and internal requirements.

b) **Competency** – Ensures the competency dashboard is up to date and there are the minimum competency numbers across ICC, 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[10] vessel schedule, dispersant availability, rig/vessels monitoring, equipment stockpiles, tracking buoy locations and the CICC duty roster.

d) **Compliance and Assurance** – Ensures all regulator inspection outcomes are actioned and closed out, the global legislation register is up to date and that the key assurance components are tracked and managed. Assurance activities (including Audits) conducted on memberships with key Oil Spill Response Organisations (OSROs) including AMOSC and OSRL are also tracked and recorded in the ICE.

The ICE assurance process records how each commitment listed in the performance tables above is managed to ensure ongoing compliance monitoring. The level of compliance can be reviewed in real time and is reported on a monthly basis through the S&EM Function.

The completion of the assurance checks (over and above the ICE process) is also applied via the Woodside Integrated Risk and Compliance System (WiRCs) and subject to the requirements of Woodside's Provide Assurance Procedure.

5.7.4 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
  - maintaining access to identified equipment and personnel

[10] 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.

- 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 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
- determining priority response receptors
- determining ALARP
- 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 Monitor and evaluate – 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 Monitor and evaluate – control measure options analysis

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/vessel/aircraft/vehicle location and duties, survey or classification society inspection requirements, overflight/port/quarantine permits and inspections, crew/pilot duty and fatigue hours, re-fuelling/re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.1.1.1 Alternative control measures

Table 6-1: Alternative control measures for monitor and evaluate ALARP evaluation

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**	**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	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
Alternate analysis technologies and methods such as gravimetric, colorimetric, infra-red and UV absorption for OM03	Due to time, limitations on sampling, equipment, methodology and analysis, the technique does not provide an environmental benefit compared to alternative available technologies	• Gravimetric (Involves lab analysis so cannot be done on location, maybe completed with field samples in laboratory) • Colorimetric requires chemical addition and catalysts no standard method, needs specialist training • Infra-red (droplet size too small for infra-red analysis) • Hydrocarbons need to be extracted from water for test, therefore requires a laboratory test) • UV absorption (Similar technology to fluorometers which are more widely available in Australia) were evaluated but all have limitations that do not improve the environmental benefit	NA	This strategy is not considered feasible, therefore no further ALARP assessment is conducted	No

6.1.1.2 Additional control measures

Table 6-2: Additional control measures for monitor and evaluate ALARP evaluation

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**	**Assessment Conclusions**	**Implemented**
Additional personnel trained to use systems for OM01	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 will be on location onboard the vessel, additional needs are met from Woodside owned stocks in King Bay Supply Facility (KBSF) and Exmouth or can be provided by service provider in a timely manner	Cost for an additional satellite tracking buoy would be A$200 per day or A$6,000 to purchase	This option is not adopted as the current capability meets the need, but additional units are available if required	No
Additional trained aerial observers	Current capability meets need. WEL has access to a pool of trained, competent observers at strategic locations to ensure timely and sustainable response. Additional observers are available through current contracts with AMOSC and OSRL	Current capability meets need. WEL has a pool of trained, competent observers at strategic locations to ensure timely and sustainable response. Additional observers are available through current contracts with AMOSC and OSRL Aviation. Standards & guidelines ensure all aircraft crews are competent for their roles. WEL 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$2,000 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 are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility.

Table 6-3: Improved control measures for monitor and evaluate ALARP evaluation

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**	**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 ICC roster to be called as soon as required. However initial information needs to be gathered by ICC 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 plus an initial A$5,000 per modelling run	This option is not adopted as the minimal environmental benefit gained is disproportionate to the cost and complexity of its implementation	No
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 no visual cross reference verification is possible 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 1 there is no environmental benefit in having vessels available from day 1. The cost of having dedicated equipment and personnel is disproportionate to the environmental benefit. The availability of vessels and personnel meets the response need	Operations are not feasible on day 1 due to the volatility of the hydrocarbon causing a health and safety risk within the first 24 hours of the response Current Woodside arrangements allow for water quality monitoring to commence by day 3. Shortening the timeframes for vessel availability would require dedicated response vessels on standby in KBSF and would accelerate the initiation of monitoring by 1 day	Cost for purchase of equipment approx. A$200,000 For dedicated equipment and personnel living locally, and on short notice to mobilise, the cost would be approx. A$1 million per annum which, due to the predicted minimal spatial and temporal impacts for this activity is disproportionate to the incremental benefit this would provide. Assets are already available on day 1. Two (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 scenario (as described in Section 2.2). This includes the following selection of source control techniques:

- Vessel SOPEP

6.2.1 Source Control via Vessel SOPEP – control measure options analysis

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.

6.2.1.1 Alternative control measures

Table 6-4: Alternative control measures for source control via vessel SOPEP ALARP evaluation

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

6.2.1.2 Additional control measures

Table 6-5: Additional control measures for source control via vessel SOPEP ALARP evaluation

Additional Control Measures considered *Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures*				
Option considered	**Environmental consideration**	**Feasibility**	**Approx. Cost**	**Implemented**
No reasonably practical additional control measures identified				N/A

6.2.1.3 Improved control measures

Table 6-6: Improved control measures for source control via vessel SOPEP ALARP evaluation

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*				
Option considered	**Environmental consideration**	**Feasibility**	**Approx. Cost**	**Implemented**
No reasonably practical improved control measures identified				N/A

6.2.2 Selected control measures

Following review of alternative, additional and improved control measures, the following controls were selected for implementation for the PAP.

- Alternative
  - None selected
- Additional
  - None selected
- Improved
  - None selected

6.3 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.

6.3.1 Existing capability – wildlife response

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/vessel/aircraft/vehicle location and duties, survey or classification society inspection requirements, overflight/port/quarantine permits and inspections, crew/pilot duty and fatigue hours, re-fuelling/re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.3.2 Wildlife response – control measure options analysis

6.3.2.1 Alternative control measures

Table 6-7: Alternative control measures for wildlife response ALARP evaluation

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**
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	*N/A*	No

6.3.2.2 Additional control measures

Table 6-8: Additional control measures for wildlife response ALARP evaluation

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**
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. Provides response equipment and personnel by Day 3. The additional cost in having a dedicated oiled wildlife response (equipment and personnel) in place is disproportionate to environmental benefit These selected delivery options provide capacity to carry out an oiled wildlife response if contact is predicted and to scale up the response if required to treat widespread contamination. Current capability meets the needs required and there is no additional environmental benefit in adopting the improvements	Although hydrocarbon contact above threshold concentrations with offshore waters is expected from day one, given the low likelihood of such an event occurring and the low environmental benefit of an offshore response, the cost of implementing measures to reduce the mobilisation time is considered disproportionate to the benefit. Additionally, the remote offshore location of the release site with no predicted contact of shoreline receptors provides sufficient opportunity for the ongoing monitoring and surveillance operations to inform the scale of the response Numbers of oiled wildlife are expected to be low in the remote offshore setting of the oiled wildlife response, given the distance from known aggregation areas Oiled wildlife response capacity would be addressed for open Commonwealth waters through the AMOSC arrangements, as informed by operational monitoring The cost and organisational complexity of this approach is moderate, and the overall delivery effectiveness is high	Additional wildlife response resources could total A$1,700 per operational site per day	No

Additional trained wildlife responders	Current numbers meet the needs required and additional personnel are available through existing contracts with oil spill response organisations and environmental panel contractors. Numbers of oiled wildlife are expected to be low in the remote offshore setting of the oiled wildlife response, given the distance from known aggregation areas The potential environmental benefit of training additional personnel is expected to be low	The capability provides the capacity to treat approximately 600 wildlife units (primarily avian fauna) by day six, with additional capacity available from OSRL. Additional equipment and facilities would be required to support ongoing response, depending on the scale of the event and the impact to fauna. Materials for holding facilities, portable pools, enclosures and rehabilitation areas would be sourced as required	Additional wildlife response personnel cost A$2,000 per person per day	No

6.3.2.3 Improved control measures

Table 6-9: Improved control measures for wildlife response ALARP evaluation

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**
Faster mobilisation time for wildlife response.	Response time is limited by specialist personnel mobilisation time This control measure provides increased effectiveness through faster mobilisation of specialists. However, no significant net environmental benefit is expected as oiled wildlife numbers are expected to be low given that no shoreline contact at impact thresholds is predicted The cost of having dedicated equipment and personnel available to respond faster is considered grossly disproportionate to the environmental benefit	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 generally low, an earlier response would provide a marginal increase in environmental benefit The selected delivery options provide the capacity to mobilise an oiled wildlife response capable of treating up to 600 wildlife from at least Day 6 and exceeds the estimated Level four OWR response. This delivery option provides the maximum expertise pooled across the participating operators, backed up by the international resources provided by OSRL The availability of vessels and personnel meets the response need	Wildlife response packages to preposition at vulnerable sites identified through the deterministic modelling cost A$700 per package per day	No

6.3.3 Selected control measures

Following review of alternative, additional and improved control measures, the following controls were selected for implementation for the PAP.

- Alternative
  - None selected
- Additional
  - None selected
- Improved
  - None selected

6.4 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.

6.4.1 Existing capability – waste management

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/vessel/aircraft/vehicle location and duties, survey or classification society inspection requirements, overflight/port/quarantine permits and inspections, crew/pilot duty and fatigue hours, refuelling/re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.4.2 Waste management – control measure options analysis

6.4.2.1 Alternative control measures

Table 6-10: Alternative control measures for waste management ALARP evaluation

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.					

6.4.2.2 Additional control measures

Table 6-11: Additional control measures for waste management ALARP evaluation

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 m^3 Cost for increased onshore temporary waste storage capability would be approx. A$40 per unit per day	This option is not adopted as the existing capability meets the need	No

6.4.2.3 Improved control measures

Table 6-12: Improved control measures for waste management ALARP evaluation

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	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

	addition, waste storage and transport will allow continuous response operations to occur This delivery option would increase known available storage, eliminating the risk of additional resources not being available at the time of the event. However, the environmental benefit of Woodside procuring additional waste storage is considered minor as the risk of additional storage not being available at the time of the event is considered low and existing arrangements provide adequate storage to support the response				

6.4.3 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

6.5 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.

6.5.1 Existing capability – scientific monitoring

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, seven 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, re-fuelling/re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.5.2 Scientific monitoring – control measure options analysis

6.5.2.1 Alternative control measures

Table 6-13: Alternative control measures for waste management ALARP evaluation

Alternative Control Measures considered *Alternative, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control*					
Ref	**Control Measure Category**	**Option considered**	**Environmental Consideration**	**Feasibility/Cost**	**Implemented**
SM01	System	Analytical laboratory facilities closer to the likely spill affected area	SM01 water quality monitoring requires water samples to be transported to National Association of Testing Authorities (NATA) rated laboratories in Perth or interstate. Consider the benefit of laboratory access and transportation times to deliver water samples and complete lab analysis. There is a time lag from collection of water samples to being in receipt of results and confirming hydrocarbon contact to sensitive receptors). The environmental consideration of having access to suitable laboratory facilities in Exmouth or Karratha to carry out the hydrocarbon analysis would provide faster turnaround in reporting of results only by a matter of days (as per the time to transport samples to laboratories).	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.	No
SM01	System	Dedicated contracted SMP vessel (exclusive to Woodside)	Would provide faster mobilisation time of scientific monitoring resources, 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.	No

6.5.2.2 Additional control measures

Table 6-14: Additional control measures for waste management ALARP evaluation

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**					
Ref	**Control Measure Category**	**Option considered**	**Environmental Consideration**	**Feasibility / Cost**	**Implemented**
SM01	System	Determine baseline data needs and provide implementation plan in the event of an unplanned hydrocarbon release	Address resourcing needs to collect post spill (pre-contact) baseline data as spill expands in the event of an instantaneous MDO spill from the activities..	Woodside relies on existing environmental baseline for receptors which have predicted hydrocarbon contact (above environment threshold) <10 days and acquiring pre-emptive data in the event of an instantaneous MDO spill from the PAP activities based on receptors predicted to have hydrocarbon contact >10 days. Ensure there is appropriate baseline for key receptors for all geographic locations that are potentially impacted <10 days of spill event, where practicable. Address resourcing needs to collect pre-emptive baseline as spill expands in the event of an instantaneous MDO spill from the activities.	Yes

6.5.2.3 Improved control measures

No reasonably practicable improved control measures identified.

6.5.3 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 activate SMPs for any identified PBAs in the event of an unplanned hydrocarbon release.
- Improved
  - None selected.

6.5.4 Operational plan

Key actions from the Scientific Monitoring Program Operational Plan (Link) for implementing the response are outlined below in Table 6-15.

Table 6-15: Scientific monitoring program operational plan actions

Responsibility	Action
Activation	
Perth ICC Planning (ICC Planning – Environment Unit)	Mobilise SMP Lead/Manager and SMP Coordinator to the ICC Planning function.
Perth ICC Planning (ICC 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.
Perth ICC Planning (ICC Planning – Environment Unit) (SMP Lead/Manager and SMP Coordinator)	SMP co-ordinator stands up the SMP contractor. Stands up subject matter experts, if required.
Perth ICC Planning (ICC 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.

Responsibility	Action
Perth ICC Planning (ICC 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 ICC.
Perth ICC Planning (ICC Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator, SMP standby contactor SMP manager)	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.
Perth ICC Planning (ICC Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator SMP standby contactor SMP manager)	Liaise with ICC Logistics, and determine the status and availability of aircraft, vessels and road transportation available to transport survey personnel and equipment to point of departure. Engage with SMP standby contactor SMP Manager and ICC 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.
Perth ICC Planning (ICC 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 (ICC).
Mobilisation	
Perth ICC 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 (ICC).
Perth ICC 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 (ICC).

6.5.5 ALARP and acceptability summary

ALARP and Acceptability Summary		
Scientific Monitoring		
ALARP Summary	X	All known reasonably practicable control measures have been adopted
	X	Additional Measures: 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 worst-case credible spill scenario. The range of strategies provide an ongoing approach to monitoring operations to assess and evaluate the scale and extent of impacts. All known reasonably practicable control measures have been adopted with the cost and organisational complexity of these options determined to be Moderate and the overall delivery effectiveness considered Medium. The SMP's main objectives can be met, with the addition of one alternative control measures to provide further benefit.	
Acceptability Summary	• The control measures selected for implementation manage the potential impacts and risks to ALARP. • In the event of a hydrocarbon spill for the PAP, the control measures selected, meet or exceed the requirements of Woodside Management System and industry best-practice. • Throughout the PAP, relevant Australian standards and codes of practice will be followed to evaluate the impacts from an instantaneous MDO spill. • 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 scenario, and uncertainty has not been used as a reason for postponing control measures.	
On the basis from the ALARP assessment, above and the risk assessment in the Eaglehawk-1 Wellhead Decommissioning 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, specifically:

- 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

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.

Additional impacts and risks associated with the control measures not included within the scope of the EP include:

- presence of personnel on the shoreline
- additional stress or injury caused to wildlife
- waste management

7.2 Analysis of impacts and risks from implementing response techniques

Table 7-1 compares the adopted control measures for this activity against the environmental values that can be affected when they are implemented.

Table 7-1: Analysis of risks and impacts

	Environmental Value						
	Soil and Groundwater	Marine Sediment Quality	Water Quality	Air Quality	Ecosystems/ Habitat	Species	Socio-Economic
Monitor and evaluate		✓	✓		✓	✓	
Source control		✓	✓	✓	✓	✓	✓
Oiled wildlife response					✓	✓	
Waste management	✓	✓	✓	✓	✓	✓	✓
Scientific monitoring	✓	✓		✓	✓	✓	✓

7.3 Evaluation of impacts and risks from implementing response techniques

7.3.1 Presence of personnel on the shoreline

Presence of personnel on the shoreline during shoreline assessment or oiled wildlife response could potentially result in disturbance to wildlife and habitats. During the implementation of response techniques, it is possible that personnel may have minimal, localised impacts on habitats, wildlife and coastlines. The impacts associated with human presence on shorelines during shoreline surveys may include:

- damage to vegetation/habitat, 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

However, any impacts are expected to be localised with full recovery expected

7.3.2 Additional stress or injury caused to wildlife

Additional stress or injury to wildlife could be caused through:

- 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 that personnel undertaking the tasks are familiar with the relevant techniques to ensure that further injury and the removal of water proofing feathers are managed and mitigated. Finally, during the release phase it's important that wildlife is not released back into a contaminated environment.

7.3.3 Waste generation

Implementing the selected response techniques (oiled wildlife response) may result in the generation of the following waste streams that will require management and disposal:

- Liquids (recovered oil/water mixture), recovered from oiled wildlife response.
- Semi-solids/solids (oily solids), collected during oiled wildlife response.
- Debris (e.g. seaweed, sand, woods, plastics), collected during 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.

7.4 Treatment of impacts and risks from implementing response techniques

In respect of the impacts and risks assessed, the following treatment measures have been adopted. It must be recognised that this environmental assessment is seeking to identify how to maintain the level of impact and risks at levels that are ALARP and of an acceptable level rather than exploring further impact and risk reduction. It is for this reason that the treatment measures identified in this assessment will be captured in Operational Plans, Tactical Response Plans, and/or First Strike Plans.

7.4.1 Presence of personnel on the shoreline

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)

7.4.2 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 9.3).

7.4.3 Waste generation

All oiled wildlife response sites zoned and marked before operations commence to prevent secondary contamination and minimise the mixing of clean and oiled waste (PS 11.1).

8 ALARP CONCLUSION

An analysis of alternative, additional and improved control measures has been undertaken to determine their reasonableness and practicability. The tables in Section 6 document the considerations made in this evaluation. Where the costs of an alternative, additional, or improved control measure have been determined to be clearly disproportionate to the environmental benefit gained from its adoption it has been rejected. Where this is not considered to be the case the control measure has been adopted.

The risks from a hydrocarbon spill have been reduced to ALARP because:

- Woodside has a significant hydrocarbon spill response capability to respond to the WCCS through the control measures identified
- New and modified impacts and risks associated with implementing response techniques have been considered and will not increase the risks associated with the activity
- A consideration of alternative, additional, and improved control measures identified any other control measures that delivered proportionate environmental benefit compared to the cost of adoption for this activity, ensuring:
  - all known, reasonably practicable control measures have been adopted
  - no additional, reasonably practicable alternative and/or improved control measures would provide further environmental benefit
  - no reasonably practical additional, alternative, and/or improved control measure exists
- A structured process for considering alternative, additional, and improved control measures was completed for each control measure
- The evaluation was undertaken based on the outputs of the WCCS so that the capability in place is sufficient for all other 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 deems the hydrocarbon spill risks and impacts have been reduced to an acceptable level by meeting all of the following criteria:

- Techniques are consistent with Woodside's processes and relevant internal requirements including policies, culture, processes, standards, structures and systems
- Levels of risk/ impact are deemed acceptable by relevant persons (external stakeholders) and are aligned with the uniqueness of, and/or the level of protection assigned to the environment, its sensitivity to pressures introduced by the activity, and the proximity of activities to sensitive receptors, and have been aligned with Part 3 of the EPBC Act
- Selected control measures meet requirements of legislation and conventions to which Australia is a signatory (e.g. MARPOL, the World Heritage Convention, the Ramsar Convention and the Biodiversity Convention). 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)

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11 GLOSSARY AND ABBREVIATIONS

11.1 Glossary

Term	Description / Definition
ALARP	Demonstration through reasoned and supported arguments that there are no other practicable options that could reasonably be adopted to reduce risks furthe
Availability	The availability of a control measure is the percentage of time that it is capable of performing its function (operating time plus standby time) divided by the total period (whether in service or not). In other words, it is the probability that the control has not failed or is undergoing a maintenance or repair function when it needs to be used
Control	The means by which risk from events is eliminated or minimised
Control effectiveness	A measure of how well the control measures perform their required function
Control measure (risk control measure)	The features that eliminate, prevent, reduce or mitigate the risk to environment associated with PAP
Credible spill scenario	A spill considered by Woodside as representative of maximum volume and characteristics of a spill that could occur as part of the PAP
Dependency	The degree of reliance on other systems in order for the control measure to be able to perform its intended function
Environment that may be affected	The summary of quantitative modelling where the marine environment could be exposed to hydrocarbons levels exceeding hydrocarbon threshold concentrations
Incident	An event where a release of energy resulted in or had (with) the potential to cause injury, ill health, damage to the environment, damage to equipment or assets or company reputation
Major Environment Event	The events with potential environment, reputation, social or cultural consequences of category C or higher (as per Woodside's operational risk matrix) which are evaluated against credible worst-case scenarios which may occur when all controls are absent or have failed
Performance outcome	A statement of the overall goal or outcome to be achieved by a control measure
Performance standard	The parameters against which [risk] controls are assessed to ensure they reduce risk to ALARP A statement of the key requirements (indicators) that the control measure has to achieve in order to perform as intended in relation to its functionality, availability, reliability, survivability and dependencies
Preparedness	Measures taken before an incident in order to improve the effectiveness of a response
Reasonably practicable	... a computation ... made by the owner, in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) [showing whether or not] that there is a gross disproportion between them ... made by the owner at a point of time anterior to the accident (Judgement: Edwards v National Coal Board [1949])
Receptors at risk	Physical, biological and social resources identified as at risk from hydrocarbon contact using oil spill modelling predictions
Receptor areas	Geographically referenced areas such as bays, islands, coastlines and/or protected area (WHA, Commonwealth or State marine reserve or park) containing one or more receptor type)
Receptor Sensitivities	This is a classification scheme to categorise receptor sensitivity to an oil spill. The Environmental Sensitivity Index (ESI) is a numerical classification of the relative sensitivity of a particular environment (particularly different shoreline types) to an oil spill. Refer to the Woodside Oil Pollution Emergency Arrangements (Australia) for more details
Regulator	NOPSEMA is 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

Term	Description / Definition
Survivability	Whether or not a control measure is able to survive a potentially damaging event is relevant for all control measures that are required to function after an incident has occurred
Threshold	Hydrocarbon threshold concentrations applied to the risk assessment to evaluate hydrocarbon spills. These are defined as: surface hydrocarbon concentration – ≥10 g/m², dissolved – ≥50 ppb and entrained hydrocarbon concentrations – ≥100 ppb
Zone of Application	The zone in which Woodside may elect to apply dispersant. The zone is determined based on a range of considerations, such as hydrocarbon characteristics, weathering and metocean conditions. The zone is a key consideration in the Net Environmental Benefit Analysis for dispersant use

11.2 Abbreviations

Abbreviation	Meaning
AIIMS	Australasian Inter-Service Incident Management System
ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
APASA	Asia Pacific ASA
AUV	Autonomous Underwater Vehicle
BAOAC	Bonn Agreement Oil Appearance Code
cST	Centistokes
CICC	Corporate Incident Coordination Centre
COP	Common Operating Picture
DM	Duty Manager
DoT	Western Australia Department of Transport
DBCA	Western Australia Department of Biodiversity, Conservation and Attractions (former Western Australian Department of Parks and Wildlife)
EMBA	Environment that May Be Affected
EMSA	European Maritime Safety Agency
EP	Environment Plan
Environment Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
ESI	Environmental Sensitivity Index
ESD	Emergency Shut Down
ESP	Environmental Services Panel
FSP	First Strike Plan
GIS	Geographic Information System
GPS	Global Positioning System
HSP	Hydrocarbon Spill Preparedness
IAP	Incident Action Plan
ICC	Incident Coordination Centre
IMT	Incident Management Team
IPIECA	International Petroleum Industry Environment Conservation Association
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union for Conservation of Nature
KBSF	King Bay Supply Facility
MEE	Major Environmental Event
MoU	Memorandum of Understanding
NEBA	Net Environmental Benefit Analysis
NOAA	National Oceanic and Atmospheric Administration
NRT	National Response Team

Abbreviation	Meaning
OILMAP	Oil Spill Model and Response System
OPEA	Oil Pollution Emergency Arrangements
OPEP	Oil Pollution Emergency Plan
OPGGSA	Offshore Petroleum and Greenhouse Gas Storage Act
OSMP	Operational and Scientific Monitoring Program
OSRL	Oil Spill Response Limited
OSRO	Oil Spill Response Organisations
OSTM	Oil Spill Trajectory Modelling
OWR	Oiled Wildlife Response
OWRP	Oiled Wildlife Response Plan
OWROP	Regional Oiled Wildlife Response Operational Plan
PAP	Petroleum Activities Program
PBA	Pre-emptive Baseline Areas
PPA	Priority Protection Area
PPB	Parts per billion
PPM	Parts per million
ROV	Remotely Operated Vehicle(s)
RPA	Response Protection Area
SCAT	Shoreline Contamination Assessment Techniques
SDA	Surface Dispersant Application
SHC	Shoreline Clean-up
SIMAP	Integrated Oil Spill Impact Model System
SMP	Scientific monitoring program
SOP	Standard Operating Procedure
SOPEP	Shipboard Oil Pollution Environment Plan
TRP	Tactical Response Plan
WHA	World Heritage Area
Woodside/ WEL	Woodside Energy Limited
WCC	Woodside Communication Centre
WCCS	Worst Case Credible Scenario
ZoA	Zone of Application

ANNEX A: NET ENVIRONMENTAL BENEFIT ANALYSIS DETAILED OUTCOMES

A NEBA has been conducted to assess the net environmental benefit of different response techniques to selected receptors in the event of an oil spill from the PAP for loss of MDO due to vessel collision. The complete list of potential receptor locations within the EMBA within the PAP is included in Section 4 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/m²)
- Shoreline accumulation (100 g/m²) at any time
- Entrained oil (>100 ppb)

The detailed NEBA assessment outcomes are shown below.

The full NEBA assessments are available at Link

Table A-1: NEBA assessment technique recommendations for MDO

Receptor	Monitor and Evaluate	Containment and Recovery	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled Wildlife Response	In situ burning	Mechanical dispersion	Source Control
Montebello CMR	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Montebello Islands Group (including State Marine Park)	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
South West Marine Parks Network -Gascoyne Commonwealth Marine Park	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Argo-Rowley Terrace CMR	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Barrow Island	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Glomar Shoals	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Muiron Islands (including MMA-WHA)	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Ningaloo RUZ (AMP in EP)	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Ningaloo Coast North (including WHA)	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
Pilbara Islands -Southern Island Group	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes

Table A-2: Overall assessment

	Monitor and Evaluate	Containment and Recovery	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled Wildlife Response	In situ burning	Mechanical dispersion	Source Control
Is this response Practicable?	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes
NEBA identifies Response potentially of Net Environmental Benefit?	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes

To reduce variability between assessments, the following ranking descriptions have been devised to guide the workshop process:

Table A-3: NEBA impact ranking classification guidance

			Degree of impact[11]	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))

[11] 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 • 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 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 (2000) 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	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 5 (OM05) Monitoring of contaminated resources	OM05 aims to implement surveys to assess the condition of fauna and habitats contacted by hydrocarbons at sensitive habitat and shoreline locations. The primary objectives of OM05 are: • Record evidence of oiled fauna (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 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 fauna 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

1. Oil spill scientific 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 scientific 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.

2. Oil spill scientific monitoring – Delivery team roles and responsibilities

2.1 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 Incident Control Centre (ICC) linkage provided in Figure C-1.

2.2 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 (Perth)	• Approves the SMPs based on operational monitoring data provided by the Planning Function • Provides advice to the ICC 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 (Perth)	• Activates the SMPs based on operational monitoring data provided by the Planning Function • Sits in the Planning function of the ICC. • Liaises with other ICC 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 (Perth)	• 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).

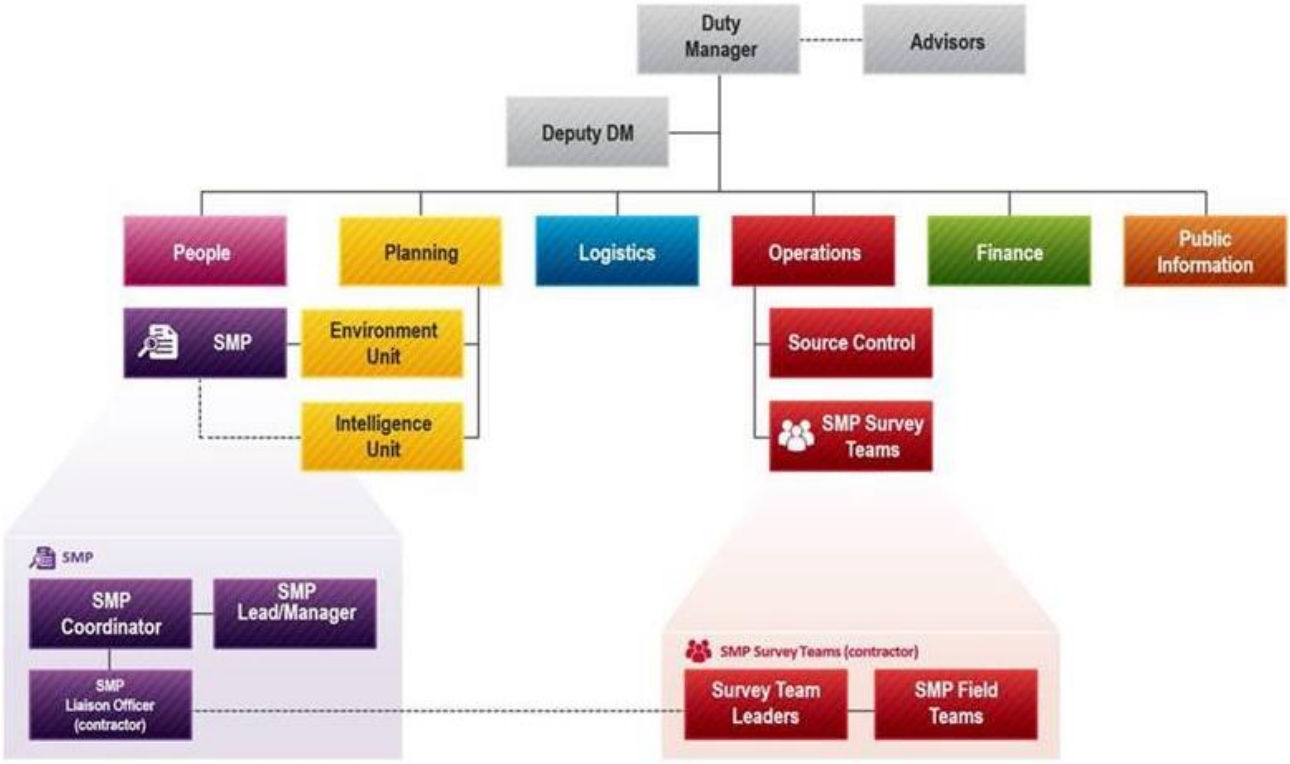

Figure C-1: Woodside oil spill scientific monitoring program delivery team and linkage to Incident Control Centre (ICC) organisational structure

Table C-2: Oil spill scientific monitoring: 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[12]) 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[13]) 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 stakeholders and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 4 (SM04) **Assessment of Impacts and Recovery of Mangroves / Saltmarsh**	The objectives of SM04 are: • Characterize the status of mangroves (and associated salt marsh habitat) at shorelines exposed/contacted by spilled hydrocarbons;	SM04 will be activated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented as follows:	SM04 will be terminated once pre-spill condition is reached and agreed upon as per the SMP termination criteria process and include consideration of:

[12] NOPSEMA (2019) Bulletin #1 – Oil spill modelling – April 2019, https://www.nopsema.gov.au/assets/Bulletins/A652993.pdf
[13] 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
	• 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.	• 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.	• Impacts to mangrove and saltmarsh habitat from hydrocarbon exposure have been quantified. • Recovery of impacted mangrove/saltmarsh habitat has been evaluated. • Agreement with relevant stakeholders 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 stakeholders 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 stakeholders and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 7 (SM07) **Assessment of Impacts to Pinniped Colonies including Haul-out Site Populations**	The objectives of SM07 are to: • Quantify impacts on pinniped colonies and haul-out sites as a result of hydrocarbon exposure/contact. • Collate and quantify impacts to pinniped populations from results recorded during OM02 and OM05 (such as mortalities, oiling, rescue and release counts) and undertake a desk-based assessment to infer potential impacts at species population levels.	SM07 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented if operational monitoring has: • As part of a pre-emptive assessment of receptor locations identified by time to hydrocarbon contact >10 days; • Identified shoreline contact of hydrocarbons ((at or above 0.5 g/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.	SM07 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Impacts to pinniped populations from hydrocarbon exposure have been quantified. • Recovery of pinniped populations has been evaluated. • Agreement with relevant stakeholders 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 (SMP)	Objectives	Activation Triggers	Termination Criteria
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 stakeholders 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 stakeholders 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 stakeholders and regulators for the management of any impacted fisheries. • Agreement with relevant stakeholders 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.

3. Activation triggers and termination criteria

3.1 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.

3.2 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, stakeholder 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 stakeholder objections. The final report following termination will include monitoring results, expert opinion and stakeholder 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).

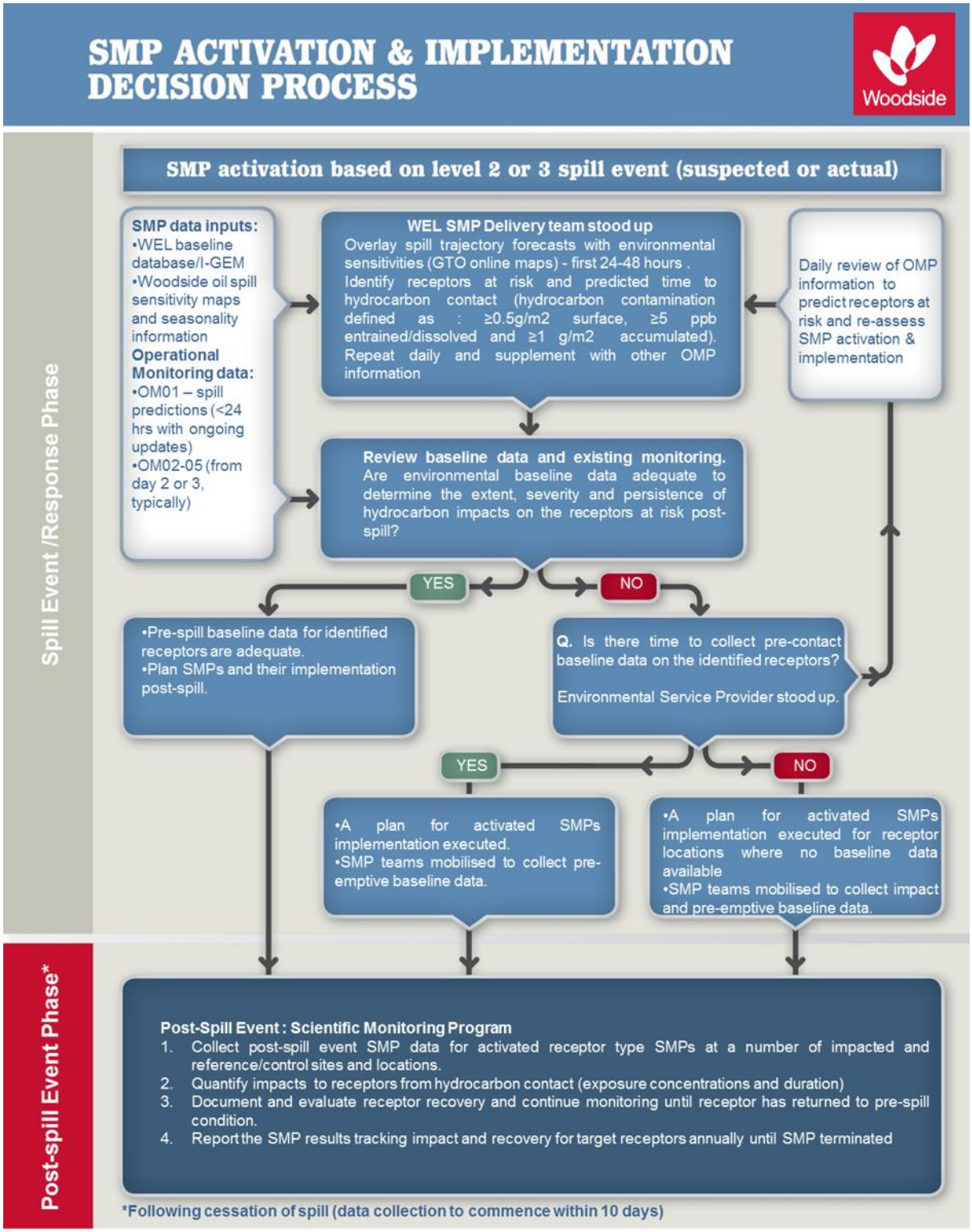

Figure C-2: Activation and implementation decision-tree for Oil Spill scientific monitoring

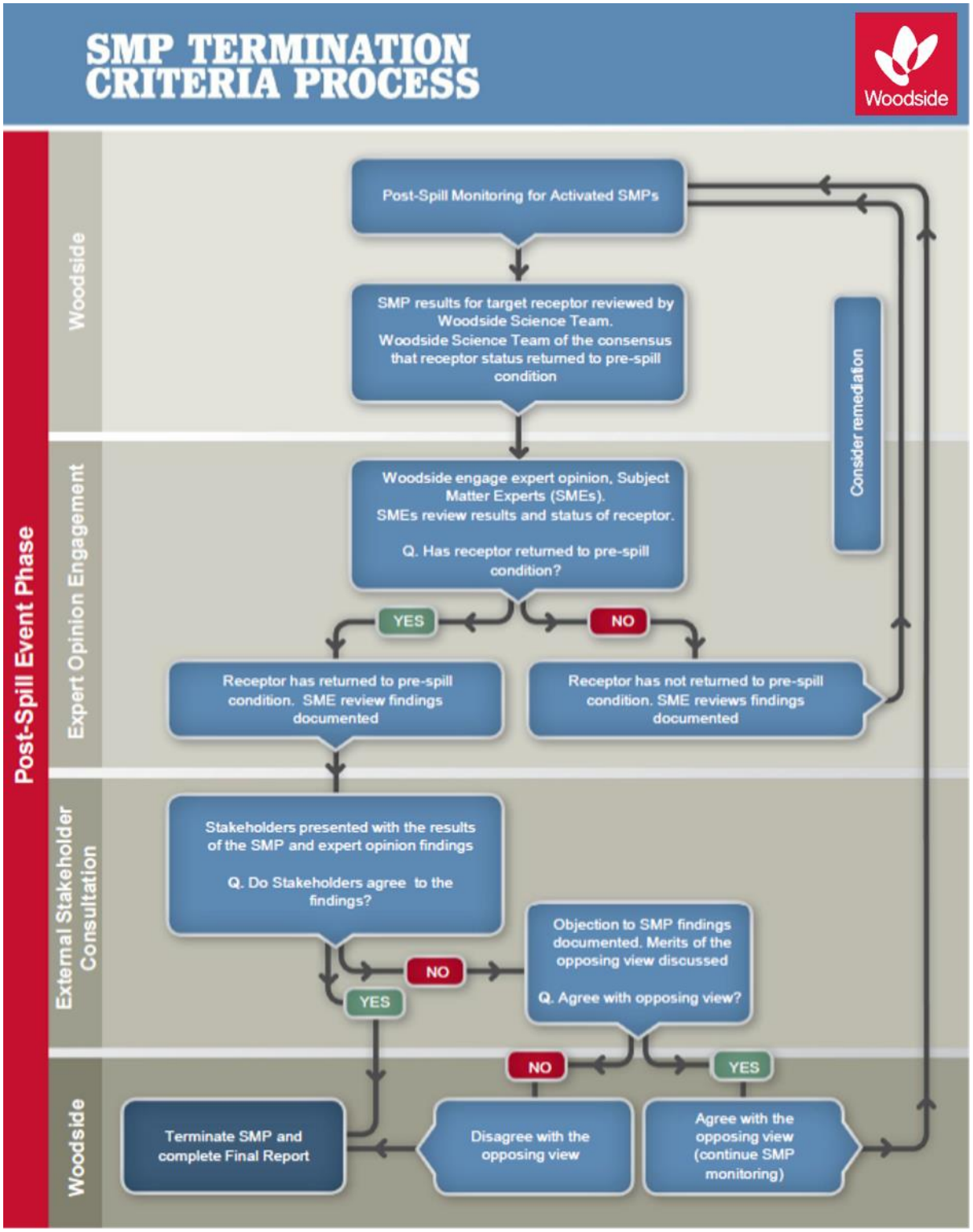

Figure C-3: Termination criteria decision-tree for oil spill scientific monitoring

4. 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.

5. 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)[14] 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.

[14] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

ANNEX D: MONITORING PROGRAM AND BASELINE STUDIES FOR THE PETROLEUM ACTIVITIES PROGRAM

Table D-1: Oil spill scientific monitoring – scientific monitoring program scope for the Petroleum Activities Program based on Spill EMBA for CS-03

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 Group (including State Marine Park)	Lowendal Islands Group (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
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
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	
Seagrass / Macro-Algae	SM03	X									X					X	X	X									X	X	X	X	X	X	X	X	X	X	X	X
Deeper Water Filter Feeders	SM03	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X						X		
Mangroves and Saltmarsh	SM04																											X					X	X	X	X	X		X	
Species																																						
Sea Birds and Migratory Shorebirds (significant colonies / staging sites / coastal wetlands)	SM05	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X
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
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
Dugongs	SM08	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								
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
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
Socio-economic																																						
Fisheries - Commercial	SM10		X	X	X	X	X	X	X	X	X	X										X	X	X	X			X	X	X		X	X	X	X	X	X	X	X
Fisheries - Traditional	SM10															X	X	X									X											X	
Tourism (incl. recreational fishing)	SM10	X		X			X	X	X		X			X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X

	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	Rankin Bank & Glomar Shoal	Montebello Islands Group	Barrow Island	Lowendal Islands Group	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Muiron Islands (Ningaloo)
Benthic Habitat (Coral Reef)	**SM03** Quantitative assessment using image capture using either diver held camera or towed video. Post analysis into broad groups based on taxonomy and morphology.	**Studies:**						
		1. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	1. Broad benthic habitat classifications and habitat maps for the Montebello Islands Group by DBCA. 2. Coral monitoring at sites across Barrow Island, Lowendal Islands Group and the Montebello Islands Group. Most recent survey 2012 3. Benthic community monitoring as part of DBCA Western Australian Marine Monitoring Program (2015-ongoing). 4. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Chevron LTM of corals for the Gorgon Gas Development. Marine Baseline Program (2008), Marine Monitoring Program (2010) Post Development Surveys (2011 – 2013). 2.Coral monitoring at sites around Barrow Island, Lowendal Islands Group and the Montebello Islands Group. Most recent survey 2012. 3.Benthic community (coral, seagrass and macroalgae) monitoring as part of DBCA's Western Australian Marine Monitoring Program (2015-ongoing). 4.Pi bara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitats surrounding the Lowendal Islands Group for the Gorgon Gas Development. Coral assemblages on the eastern side of Double Island, and coral bommies on the south-western edge of the Lowendal Shelf. 2. Coral monitoring at sites across Barrow Island, Lowendal Islands Group and the Montebello Islands Group. Most recent survey 2012. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitat mapping of the subtidal and intertidal habitats of the islands and shoals. Coral communities in shallow subtidal habitat, intertidal pavement. 2. Coral monitoring at Varanus and Airlie Islands (2000 to present) to identify corals, growth from and percentage cover 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013; 2016)	Coral Reefs & Filter Feeders 1. Montebello Marine Park, 2019, Identification and qualitative descriptions of benthic habitat. 2. Montebello Australian Marine Parks – 2019 – Baseline survey on benthic habitats. 3. Pluto Trunkline within Montebello Marine Park – Monitoring marine communities.	1. DBCA LTM Ningaloo Reef program: 1991-ongoing 2. AIMS/DBCA 2014 Baseline Ningaloo and Muiron Islands Survey – repeat and expansion on the LTM (Co-funded survey: Woodside and AIMS). 3. Pilbara Marine Conservation Partnership. 4. WAMSI LTM Study: Ningaloo Research node: 2009 -10 over the length of Ningaloo reef system (with a focus on coral and fish recruitment). 5. Ningaloo Outlook (CSIRO) - Shallow and Deep Reefs Program (2015-ongoing). 6. Ningaloo Collaboration Cluster: Habitats of the Ningaloo Reef and adjacent coastal areas determined through hyperspectral imagery.
		Methods:						
		1. Towed video transects, photo quadrats using towed video system. 2. Towed video transects, photo quadrats using towed video system. 3. Towed video transects, photo quadrats using towed video system. 4. Towed video transects, photo quadrats using towed video system.	1. Habitat mapping. 2. Quantitative assessment details not available. 3. Drop camera. 4. Fixed long-term monitoring sites. Diver video transect. 5. Towed video, benthic trawl and sled.	1. Belt transect, size class frequency, video transects, photo quadrat, tagged colonies and terracotta tiles for coral recruitment. 2. Quantitative assessment 3. Fixed long-term monitoring sites. Diver video transects. 4. Towed camera, benthic trawl and sled.	1. Benthic habitat mapping, diver swum transects, tagged colonies. 2. Quantitative assessment 3. Towed video, benthic trawl and sled.	1. ROV transects. 2. ROV transects and driver surveys 3. Towed video, benthic trawl and sled	1.ROV Transects 2. Benthic habitat mapping, multibeam acoustic swathing. 3. ROV video.	1. LTM transects, diver based (video) photo quadrats, specimen collection. 2. LTM sites, transects, diver-based video quadrat. 3. Diver video transects, still photography, video and in situ visual estimates from transects, quadrats, manta-tows, towed video and ROV. 4. Video point intercept transects recorded by towed video or diver hand-held video camera. 5. Video transects. 6. LTM transects, diver based (video) photo quadrat.

		References and Data:						
		1. AIMS 2014a and Abdul Wahab et al., 2018. DATAHOLDER: AIMS. 2. AIMS 2014b. DATAHOLDER: AIMS. 3.Currey-Randall et. al., 2019. DATAHOLDER: AIMS 4. Currey-Randall et. al., 2019. DATAHOLDER: AIMS	1. DBCA 2007. DATAHOLDER: DBCA. 2. RPS, 2012. DATAHOLDER: Santos. 3. DATAHOLDER: DBCA. 4. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Baseline: Chevron Australia 2010. Marine Monitoring Program: Chevron Australia 2011 Post Dredge: Chevron Australia 2013 DATAHOLDER: Chevron Australia. 2. RPS, 2012. DATAHOLDER: Santos. 3. Bancroft 2009. DATAHOLDER: DBCA. 4. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. RPS-Bowman Bishaw Gorham 2005. DATAHOLDER: Chevron. 2. RPS, 2012. DATAHOLDER: Santos. 3. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Chevron 2010. DATAHOLDER: Chevron. 2. Quadrant Energy/Santos 2016 DATAHOLDER: Santos 3. CSIRO (2013; 2016). Roland Pitcher. DATAHOLDER	1. Advisian 2019 2. Keesing 2019 3. McLean et al. 2019	1. DBCA unpublished data. DATAHOLDER: DBCA 2. AIMS 2015. DATAHOLDER: AIMS. 3. Pi bara Marine Conservation Partnership DATAHOLDER: CSIRO 4. Depczynski et al. 2011 DATAHOLDER: AIMS, DBCA and WAMSI. 5. CSIRO 2019 – Ningaloo Outlook Program 6. Murdoch University - Kobryn et al 2011 and Keulen & Langdon 2011.

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	**Montebello** Islands Group	**Barrow Island**	**Lowendal** Islands Group	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Muiron Islands **(Ningaloo)**
Benthic Habitat (Seagrass and Macro-algae)	**SM03** Quantitative assessment using image capture using either diver held camera or towed video. Post analysis into broad groups based on taxonomy and morphology.	**Studies:**						
		1. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	1. Santos, macroalgae monitoring at sites across Lowendal Islands Group and the Montebello Islands Group in 2012. 2. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Chevron LTM of Seagrass and Macro algae habitats for the Gorgon Gas Development project. Marine baseline Program (2008, 2009), Marine Monitoring Program (2010), Post Dredge Survey one (2011) 2. Chevron study by RPS in 2004 on Barrow Island intertidal zone. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitats including seagrass and macroalgae for the (Lowendal Islands Group, Chevron Janz Feed Gas Pipeline Project.) Gorgon Gas Development Project. 2. Santos macroalgae monitoring at sites across Lowendal Islands Group and the Montebello Islands Group in 2012. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitat mapping of the subtidal and intertidal habitats of the islands and shoals. Algae communities in shallow subtidal habitat, intertidal pavement. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013; 2016)	N/A – see Table D-1	1. Quantitative descriptions of Ningaloo sanctuary zones habitats types including lagoon and offshore areas – Cassata and Collins (2008). 2. CSIRO/BHP Ningaloo Outlook Program. 3. Ningaloo Collaboration Cluster: Habitats of the Ningaloo Reef and adjacent coastal areas determined through hyperspectral imagery. 4. Australian Institute of Marine Science – CReefs: Ningaloo Reef Biodiversity Expeditions (2008-2010).
		Methods:						
		1. Towed video transects, photo quadrats using towed video system. 2. Towed video transects, photo quadrats using towed video system. 3. Towed video transects, photo quadrats using towed video system. 4. Towed video transects, photo quadrats using towed video system	1. Quantitative assessment details not available. 2. Towed video, benthic trawl and sled.	1. Diver transects, photo quadrats, biomass. 2. Physical observational survey of intertidal habitats on Barrow Island. 3. Towed video, benthic trawl and sled.	1. Diver Transects, Photo Quadrats. 2. Quantitative assessment details not available. 3. Towed video, benthic trawl and sled.	1. ROV transects. 2. Towed video, benthic trawl and sled	N/A – see Table D-1	1. Video transects to ground truth aerial photographs and satellite imagery. 2. Diver video transects. 3. LTM transects, diver based (video) photo quadrat. 4. LTM transects, diver based (video) photo quadrats, specimen collection.
		References and Data:						
		1. AIMS 2014a and Abdul Wahab et al., 2018. DATAHOLDER: AIMS. 2. AIMS 2014b. DATAHOLDER: AIMS. 3. Currey-Randall et. al., 2019. DATAHOLDER: AIMS 4. Currey-Randall et. al., 2019. DATAHOLDER: AIMS	1. RPS 2012. DATAHOLDER: Santos. 2. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Baseline: Chevron Australia 2010. Marine Monitoring Program: Chevron Australia 2011 Post Dredge: Chevron Australia 2013 DATAHOLDER: Chevron Australia. 2. RPS-Bowman Bishaw Gorham 2005. DATAHOLDER: Chevron Australia. 3. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. RPS-Bowman Bishaw Gorham 2005. DATAHOLDER: Chevron. 2. RPS 2012. DATAHOLDER: Santos. 3. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Chevron 2010. DATAHOLDER: Chevron 2. CSIRO (2013, 2016). Roland Pitcher. DATAHOLDER	N/A – see Table D-1	1. Cassata and Collins 2008. DATAHOLDER: Curtin University – Applied Geology. 2. CSIRO – Ningaloo Outlook Program 3. Murdoch University - Kobryn et al 2011 and Keulen and Langdon 2011. 4. AIMS (2010) - http://www.aims.gov.au/creefs

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands Group	Barrow Island	Lowendal Islands Group	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Muiron Islands (Ningaloo)
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. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – see Table D-1	1.WAMSI 2007 deep-water Ningaloo benthic communities' study, Colquhoun and Heyward (2008). 2.CSIRO/BHP Ningaloo Outlook Program - Deep reef themes 2020
		Methods:						
		1. Towed video transects, photo quadrats using towed video system. 2. Towed video transects, photo quadrats using towed video system. 3. Towed video transects, photo quadrats using towed video system. 4. Towed video transects, photo quadrats using towed video system.	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – see Table D-1	1.Towed video and benthic sled (specimen sampling). 2.Side-scan sonar and AUV transects.
		References and Data:						
		1. AIMS 2014a and Abdul Wahab et al., 2018. DATAHOLDER: AIMS. 2. AIMS 2014b. DATAHOLDER: AIMS. 3. Currey-Randall et. al., 2019. DATAHOLDER: AIMS 4. Currey-Randall et. al., 2019. DATAHOLDER: AIMS	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – see Table D-1	1.Colquhoun and Heyward (eds) 2008. DATAHOLDER: WAMSI, AIMS. 2.CSIRO – Ningaloo Outlook 2020

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands Group	Barrow Island	Lowendal Islands Group	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Muiron Islands (Ningaloo)
Mangroves and Saltmarsh	**SM04** Aerial photography and satellite imagery will be used in conjunction with field surveys to map the range and distribution of mangrove communities.	**Studies:**						
		N/A – See Table D-1	1. Atmospheric correct and land cover classification, NW Cape. 2. Advanced Land Observing Satellite (ALOS) images taken in 2006, 2008, and 2010 by DBCA. Digital Aerial Photos were taken in 2009, and the area ground-truthed in 2006. 3. Ground truthing aerial photography to map the spatial extent of mangroves on the Montebello Islands Group. 4. Mangrove monitoring as part of DBCA Western Australian Marine Monitoring Program (ongoing).	1. Chevron LTM of Mangroves for the Gorgon Gas Development project. Marine Baseline Program (2009), Post Dredge Survey 1 (2011), Post Dredge Survey 2 (2013). 2. Baseline state of the mangroves 2008.	1. Atmospheric correct and land cover classification, NW Cape. 2. Santos Mangrove baseline (2010). 3. Santos - Long-term mangrove monitoring (1999-2011).	1. Study conducted by URS (November 2008 to May 2009) to ground truth aerial photography taken between 2001 and 2009 and to identify mangrove species present in the area.	N/A – see Table D-1	1.Atmospheric correct and land cover classification, NW Cape. 2.Woodside hold Rapid Eye imagery of the Ningaloo Reef and coastal area. 3.Hyperspectral survey (2006) of Ningaloo Reef and coastal area (not yet analysed for Mangroves). 4.North West Cape sensitivity mapping 2012 included Mangrove Bay. 5.Global mangrove distribution as mapped by the USGS and located on UNEP's Ocean Data viewer.
		Methods:	Methods:					
		N/A – See Table D-1	1. Modular Inversion Program. May 2017 2. ALOS and Digital aerial photos, ground truthing, for Mangrove extent and mangrove relative canopy density. 3. Species Composition, LUX, canopy density. 4. Methods unknown.	1.Health scoring system, percentage cover, mean canopy density, qualitative health assessment. 2. Annual Mangrove composition, canopy density, pneumatophore density, leaf pathology, qualitative health.	1. Modular Inversion Program. May 2017 2.Aerial imagery (resolution of 0.2 m2 captured in 2010). 3. Qualitative data includes the presence of new growth, reproductive state, extent of defoliation and pneumatophore condition. Quantitative data, collected at the tree level, includes seedling density, stem diameter, number of defoliated branches and a number of canopy condition parameters.	1.Aerial Photography and Satellite imagery Species identification and community composition.	N/A – see Table D-1	1.Modular Inversion Program. May 2017 2.Rapid Eye imagery – High resolution satellite imagery from October/November/December 2011 and 2017. 3.Remote sensing – acquisition of HyMap airborne hyperspectral imagery and ground truthing data collection. 4. Reconnaissance surveys of the shorelines of the North West Cape and Muiron Islands. 5.Remote sensing study of global mangrove coverage.
		References and Data:						

		N/A – See Table D-1	1. EOMAP, 2017 DATAHOLDER: Woodside. 2.DBCA unpublished data. DATAHOLDER: DBCA. 3. Voga unpublish data DATAHOLDER: Voga Contact: [redacted] 4. DBCA. DATAHOLDER DBCA.	Baseline: Chevron Australia 2010. Marine Monitoring Program: Chevron Australia 2011 Post Dredge: Chevron Australia 2013 DATAHOLDER: Chevron Australia. Chevron 2014. DATAHOLDER: Chevron.	1. EOMAP, 2017 DATAHOLDER: Woodside. 2.Santos 2014. DATAHOLDER: Santos. 3. Santos 2011. DATAHOLDER: Santos.	1. URS (2010) DATAHOLDER: Chevron Australia	N/A – see Table D-1	1.EOMAP 2017 DATAHOLDER: Woodside. 2.AAM 2014. Dataholder: Woodside 3.Kobryn et al. 2013. DATAHOLDER: Murdoch University, AIMS; Woodside. 4.Joint Carnarvon Basin Operators, 2012. DATAHOLDER: Woodside and Apache Energy Ltd. 5.http://data.unep-wcmc.org/

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands Group	Barrow Island	Lowendal Islands Group	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Muiron Islands (Ningaloo)
Seabirds	**SM05** Visual counts of breeding seabirds, nest counts, intertidal bird counts at high tide.	**Studies:**						
		N/A – See Table D-1	1.No recent studies. A DBCA/WAM study of terrestrial fauna of the islands was published in 2000 (Burbidge et al 2000). The most recent bird survey referenced in this review was 1998 by DBCA (DPaW, CALM).	1. Barrow Island migratory behaviour, nesting and foraging behaviour. 2. Migratory waders at Barrow Island. 3. LTM on Barrow island (island wide) Study September 2003 – 2006. 4. Chevron - Gorgon Gas Development. Terrestrial and subterranean environment monitoring program (2008-2015). Monitoring of Wedge-tailed Shearwaters, Bridled Terns, Silver Gulls.	1. Ongoing study of Bridled Terns from 2009. 2. Quadrant Energy seabird nesting on Lowendal Islands Group, study 2013. 3. Lowendal Islands Group, common breeding bird species, structure, feeding and disturbances to the population. 4. Quadrant Energy/Santos – Integrated Shearwater Monitoring Program (1994-2016).	1. Migratory waterbirds relevant to the Wheatstone Project on behalf of URS in 2008 - 2009. 2. Quadrant Energy/Santos – Integrated Shearwater Monitoring Program (1994-2016). 3. Exmouth Sub-basin Avifauna Monitoring Program (2013-2014)	Present, in open water, no breeding habitat.	1. LTM Study of marine and shoreline birds: 1970-2011. 2. LTM of shorebirds within the Ningaloo coastline (Shorebirds 2020). 3. Exmouth Sub-basin Marine Avifauna Monitoring Program (Quadrant Energy/Santos). 4. Seabird and Shorebird baseline studies, Ningaloo Region – Report on January 2018 bird surveys. 5.Wedge-tailed shearwater foraging behaviour in the Exmouth Region – Final Report
		Methods:						

		N/A – See Table D-1	1. Bird observations and counts.	1. Species, total numbers, Distribution, Roosting locations and foraging numbers. Migratory behaviour. 2. High tide roost counts, abundance counts. 3. Nest burrow density (number of burrows per m2); presence/absence of eggs or chicks in burrows; collapsed burrows and predation and mortality records. 4. Barrow Island: Variation in abundance and spatial/temporal distribution on beaches. Middle Island: Abundance; nest density; Presence and absence of eggs/chicks in nest.	1. Nest Density, presence and absence of chicks, predation and mortality counts. 2. Nest burrow density (number of burrows per m2); presence/absence of eggs or chicks in burrows. 3. Burrow scopes, Ultrasonic monitors to monitor burrows. 4. The distribution and abundance of other nesting seabirds within the Lowendal Islands Group, including up to 45 islands and islets, also occurred from 2004 onwards.	1. Ground counts, aerial surveys of wetlands by helicopter. 2. Burrow count and observation data, burrow density, colony stability, breeding participation, incubation effort and reproductive success has been determined. Tagging data 3. Aerial surveys and onshore island surveys.	N/A	1. Counts of nesting areas, counts of intertidal zone during high tide. 2. The Shorebirds 2020 database comprises the most complete shorebird count data available in Australia. The data have been collected by volunteer counters and BirdLife Australia staff for approximately 150 roosting and feeding sites, mainly in coastal Australia. The data go back as far as 1981 for key areas. 3. The Exmouth Sub-basin Marine Avifauna Monitoring Program undertook a detailed assessment of seabird and shorebird use in the Exmouth Sub-basin. Four aerial surveys and four island surveys were conducted between February 2013 and January 2015 for this Program, inclusive of the mainland coasts, of shore islands and a 2,500 km² area of ocean adjacent to the Exmouth Sub-basin. 4.Shorebird counts, Shearwater Burrow Density. 5. Telemetry (GPS & Satellite).
		References and Data:						
		N/A – See Table D-1	DBCA/WAM – Burbidge et al 2000.	1. Bamford M.J. & A.R 2004. DATAHOLDER: Chevron. 2. Bamford M.J & A.R 2011. DATAHOLDER: Chevron. 3. Chevron, 2013. DATAHOLDER: Chevron. 4. Chevron 2013. DATAHOLDER: Chevron.	1. Bamford M.J. & A.R 2004. DATAHOLDER: Chevron. 2. Surman 2012. DATAHOLDER: Santos. 3. Bamford M.J & A.R 2011. DATAHOLDER: Chevron. 4. DATAHOLDER: Santos.	1. Bamford, MJ & AR. 2011. DATAHOLDER: Chevron. 2. Quadrant Energy/Santos. Dataholders. Santos 3. Quadrant Energy/Santos. Dataholders. Santos	N/A	1. Johnstone et al. 2013. DATAHOLDER: WA MUSEUM. AMOSC/DBCA (DPaW) 2014. 2. BirdLife Australia DATAHOLDER: Woodside and BirdlLife Australia 3. Surman & Nicholson 2015. 4. BirdLife Australia: DATAHOLDER: Woodside 5. Cannel et al. 2019 DATAHOLDER: UWA and BirdLife Australia

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands Group	Barrow Island	Lowendal Islands Group	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Muiron Islands (Ningaloo)
		Studies:						
Turtles	**SM06** Beach surveys (recording species, nests, and false crawls).	N/A – See Table D-1	1. LTM Study of Green, Flatback, Hawksbill turtles on beaches within the Barrow, Lowendal Islands Group and Montebello Islands Group Complex for Chevron. 2. Marine turtle monitoring as part of DBCA long-term turtle monitoring program (ongoing).	Chevron - Gorgon Gas Development. Long-term Turtle Monitoring Program - Flatback tagging program and marine turtle track census program (2005 – ongoing).	1. LTM Study of Green, Flatback, Hawksbill turtles on beaches within the Barrow, Lowendal Islands Group and Montebello Islands Group Complex. 2. Santos 2013 turtle nesting survey on the Lowendal islands. 3. Varanus Island Turtle monitoring program (2005 – present).	1. Baseline marine turtle surveys 2009 (included the islands of Serrurier, Bessieres and Thevenard), Pendoley (2009). 2. Exmouth Islands Turtle Monitoring Program (2013 and 2014) 3. North West Shelf Flatback Turtle Conservation Program's 4. Inter-nesting distr bution of flatback turtles and industrial development in Western Australia (Thevenard Island)	Present, in open water, no nesting habitats.	1. Exmouth Islands Turtle Monitoring Program. 2. Ningaloo Turtle Program 3. Turtle activity and nesting on the Muiron Islands and Ningaloo Coast (2018). 4. Spatial and temporal use of inter-nesting habitat by sea turtles along the Murion Islands and Ningaloo Coast – 2018-2019
		Methods:						
		N/A – See Table D-1	Nesting demographics (composition, spatial variability, seasonal distribution, post-nesting dispersion).	Island wide (though primary nesting occurs on east coast). Mundabullangana on mainland is the reference location for the Flatback tagging program.	1. Nesting demographics (composition, spatial variability, seasonal distribution, post-nesting dispersion). 2. Tagging and nest counts. 3. Tagging and nest counts. Varanus, Beacon, Bridled, Abutilon and Parakeelya islands.	1. Beach/Nesting surveys (counts by species). 2. Beach/Nesting surveys (counts by species). 3. Nesting and tagging studies 4. Satellite tracking methods	N/A	1. Astron (on behalf of Santos) to address a gap in the knowledge of turtle numbers at key locations (offshore islands within the region) that are not currently part of an existing monitoring programs (e.g. the NTP). Field surveys were conducted in October 2013 and January 2014. Surveys were conducted on 12 islands, with each island surveyed once (with the exception of Beach 8 at North Muiron Island) and all tracks counted. 2. Long term trends in marine turtle populations, beach surveys, track counts, best location, mortality counts. 3. On-beach monitoring and aerial surveys. 4. Tagging (satellite transmitter), analysis of internesting, migration and foraging grounds movements and behaviour.
		References/Data:						
		N/A – See Table D-1	1. AMOSC/DPaW 2014. DATAHOLDER: Chevron. 2.DBCA.	Pendoley Environmental (2005-ongoing). DATAHOLDER: Chevron.	1. Pendoley 2005. AMOSC/DBCA (DPaW) 2014. DATAHOLDER: Chevron/ Santos. 2. Santos, 2014. DATAHOLDER: Santos. 3. Santos (2005 – present)	1. Pendoley 2009. DATAHOLDER: Chevron. 2. Quadrant Energy/Santos. Dataholders. Santos 3. DBCA. Dataholder 4. Pendoley Environment - Whittock, Pendoley and Hamann (2010-2011)	N/A	1.Santos – Report. 2. NTP Annual Reports DATAHOLDERS: DBCA. Reports available at http://www.ningalooturtles.org.au/media_reports.html 3.Rob et al. 2019 DATAHOLDER: DBCA 4.Tucker et al. 2019 DATAHOLDER: DBCA

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands Group	Barrow Island	Lowendal Islands Group	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Muiron Islands **(Ningaloo)**
Fish	**SM09** Baited Remote Underwater Video Stations (BRUVS), Visual Underwater Counts (VUC), Diver Operated Video (DOV).	**Studies:**						
		1. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	1. DBCA diver surveys 2009-2012. 2. Pilbara Marine Conservation Partnership Stereo BRUVS drops in shallow water (~8-20m) in 2014 and deeper (20-60m) in 2015 inside and outside sanctuary zones at the Montebello Islands Group and in the area from Cape Preston to the Montebello Islands Group in 2015. 3. Finfish monitoring as part of DBCA Western Australian Marine Monitoring Program (2015-ongoing).	1. Chevron LTM of demersal fish for the Gorgon Gas Development project. Marine Baseline Program (2008, 2009), Post Dredge Survey 1 (2011), Post Dredge Survey 2 (2012). 2. Pilbara Marine Conservation Partnership Stereo BRUVS drops in shallow water (~10m) from Exmouth to Barrow Islands in 2015. 3. Finfish monitoring as part of DBCAs Western Australian Marine Monitoring Program (2015-ongoing).	1. Pilbara Marine Conservation Partnership Stereo BRUVS drops in shallow water (~10m) Montebello Sanctuaries 2015. 2. WA Museum fish surveys of Dampier Archipelago 1998-2000 (Hutchins 2004).	1.Pilbara Marine Conservation Partnership Stereo BRUVS drops in deep water (20-55m) offshore of Bessieres Island in 2016.	1. CSIRO – Fish Diversity. 2. Fish species richness and abundance.	1. AIMS/DBCA 2014 Baseline Ningaloo Survey – repeat and 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
		Methods:						

		1. BRUVs. 2. BRUVs. 3. BRUVs. 4. BRUVs.	1. Diver Operated Video - species richness, community composition, and biomass were recorded from 2009-2012. 2. Stereo BRUVS. 3. Diver UVS.	1. Intertidal and subtidal surveys using BRUVS and Netting. 2. Stereo BRUVS. 3. Diver UVS.	1. Stereo BRUVS 2. Diver surveys _ Underwater Visual Census (UVC).	1. Stereo BRUVs	1. Semi V Wing trawl net or an ep benthic sled. 2. ROV Video..	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
		References/Data:						
		1. AIMS 2014a and Abdul Wahab et al., 2018. DATAHOLDER: AIMS. 2. AIMS 2014b. DATAHOLDER: AIMS. 3. Currey-Randall et. al., 2019. DATAHOLDER: AIMS 4. Currey-Randall et. al., 2019. DATAHOLDER: AIMS	1. DBCA data. DATAHOLDER: DBCA 2. CSIRO Data DATAHOLDER: CSIRO Data centre [redacted]) 3. DBCA.	1. Baseline: Chevron Australia 2010. Marine Monitoring Program: Chevron Australia 2011. Post Dredge: Chevron Australia 2013 DATAHOLDER: Chevron Australia. 2. CSIRO Data DATAHOLDER: CSIRO Data centre [redacted]) 3. DBCA.	1. UWA. The UWA Oceans Institute & School of Biological Sciences. 2. DATAHOLDER: Woodside and WAM.	1. CSIRO. DATAHOLDER: CSIRO ([redacted])	1. Keesing 2019. 2. McLean et al. 2019.	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 ([redacted]). 7. DATAHOLDER: WAMSI 8. CSIRO – Ningaloo Outlook 2020.

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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 and Glomar Shoals
Barrow and Lowendal Islands
Pilbara Islands - Southern Island Group
Montebello Is - Stephenson Channel Nth
Montebello Is Champagne Bay and Chippendale channel
Montebello Is - Claret Bay
Montebello Is - Hermite/Delta Is Channel
Montebello Is - Hock Bay
Montebello Is - North and Kelvin Channel
Montebello Is - 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 and 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

APPENDIX F: STAKEHOLDER CONSULTATION

Eaglehawk-1 Exploration Wellhead Decommissioning Environment Plan

Date: November 2021

Revision: 0

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1. CONSULTATION

1.1 Email sent to the following relevant stakeholders (30 August 2021)

- ABF
- DISER
- DMIRS
- DoT
- APPEA

Dear Stakeholder

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.2 Email sent to Department of Transport (2 September 2021)

Dear [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 *Eaglehawk-1 Exploration Wellhead Decommissioning Environment Plan,* located in permit WA-28-P, and 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 *Eaglehawk-1 Exploration Wellhead Decommissioning 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 propose to submit an EP on 22nd October 2021 to support these activities.

Should you require additional information or have a comment to make about the proposed activity, please contact myself by close of business 8th October to allow us sufficient time to inform our activity planning and EP development.

Comments can be made by email, letter or by phone.

Please be aware that your feedback will be communicated to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), as is required under legislation.

We look forward to hearing from you.

Many thanks,

[redacted]

Information Requested in the Offshore Petroleum Industry Guidance Note (July 2020)	**Information Provided & Reference**	
Description of activity, including the intended schedule, location (including coordinates), distance to nearest landfall and map.	Included in the consultation information sheet	
Worst case spill volumes.	Included in Appendix A of the First Strike Plan	
Known or indicative oil type/properties.	Included in Appendix A of the First Strike Plan	
Amenability of oil to dispersants and window of opportunity for dispersant efficacy.	Dispersant is not deemed to be suitable for marine diesel spill.	
Description of existing environment and protection priorities.	Included in section 4 of the First Strike Plan	
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 2017).	Unplanned loss of containment events from the Petroleum Activities Program have been identified during the risk assessment process (presented in Section 7 of the EP). Further descriptions of risk, impacts and mitigation measures (which are not related to hydrocarbon preparedness and response) are provided in Section 7 of the EP. One unplanned events or credible spill scenarios for the Petroleum Activities Program has been selected as representative across types, sources and incident/response levels, up to and including the WCCS. Table 2-1 of the OSPRMA presents the credible scenarios for the Petroleum Activities Program. One worst-case credible scenario (CS-03) has 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 an event 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.	
Outcomes of oil spill trajectory modelling, including predicted times to enter State waters and contact shorelines.		Credible Scenario-03 – surface release of marine diesel after a vessel collision 500 m^3 marine diesel – residue of 25 m^3 (5%)
		Minimum time to shoreline contact (above 100g/m^2) in days
	Shoreline receptors	No contact
Details on initial response actions and key activation timeframes.	Included in Section 2 and 3 of the First Strike Plan	
Potential Incident Control Centre arrangements.	Included in Appendix E and F 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 2 and 3 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 E and F of the First Strike Plan	

Details on testing of arrangements of OPEP/OSCP.	• Level 1 Response – two Level 1 'First Strike' drills conducted per year. • Level 2 Response – a minimum of one Emergency Management exercise will be conducted every two years. • 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** 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 each of these arrangements is adequately tested, the Hydrocarbon Spill Preparedness Capability and Competency Coordinator ensures tests are conducted in alignment with the Hydrocarbon Spill Arrangements Testing Schedule (Woodside Doc No. 10058092). Woodside's Hydrocarbon Spill Preparedness & Response Testing Schedule aligns with international good practice for spill preparedness & response management; the testing is compatible with the IPIECA Good Practice Guide and the Australian Emergency Management Institute Handbook. The Hydrocarbon Spill Arrangements Testing Schedule (Woodside Doc No. 10058092) identifies the type of test which will be conducted annually for each arrangement, and how this type will vary over a five year rolling schedule. Testing methods may include (but are not limited to): audits, drills, field exercises, functional workshops, assurance reporting, assurance monitoring and reviews of key external dependencies. Activity specific Oil Spill Pollution First Strike Plans are developed to meet the response needs of that particular activity's Worst Credible Spill Scenario (WCCS). The ability to implement these plans may rely on specific arrangements or those common to other Woodside activities. Regardless of their commonality each arrangement will be tested in at least one of the methods annually. This ensures that personnel are familiar with spill response procedures, reporting requirements, and roles/ responsibilities. At the completion of testing a report is produced to demonstrate the outcomes achieved against the tested objectives. The report will include the lessons learned, any improvement actions and a list of the participants. Alternatively, an assurance report, assurance records, or audit report may be produced. These reports record findings and include any recommendations for improvement. Improvement actions and their close-out are actively recorded and managed. This is over and above the emergency management exercises conducted.
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.

1.3 Email sent to Australian Fishing Management Authority, Commonwealth Fisheries Association and Australian Southern Bluefin Tuna Industry Association (30 August 2021)

Dear Stakeholder

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

You are being contacted as you've been identified as a relevant stakeholder based on fishing licence overlap with the activity area, assessment of government fishing effort data (including AFMA) from recent years, fishing methods and water depth.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

An information sheet (also on our website), and a map of Commonwealth fisheries is attached.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Relevant Fisheries:	**State:** Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
*Additional Fisheries: (*Consultation based on AFMA advice to consult all fisheries with entitlements to fish in the area)*	**Commonwealth:** Southern Bluefin Tuna fishery, Western Tuna and Billfish Fishery, Western Skipjack Fishery
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support

The vessels will operate on dynamic positioning (DP) and will not anchor/moor on the seabed
Vessels will operate 24 hours per day for the duration of the activities

Wellhead Location:

Wellhead	Water depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Potential risks to commercial fishing and proposed mitigation measures:

Eaglehawk-1 wellhead being removed

Potential Risk	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure on seafloor causing interference or displacement	Physical presence of infrastructure on the seafloor causing temporary interference / displacement	Wellhead location marked on marine charts until removal completed Wellhead proposed to be removed
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 and Woodside’s Environmental Performance Standards where applicable
Seabed disturbance	Disturbance to the seabed from removal activities	Attempted retrieval of dropped objects No anchoring of vessels
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 dates and any exclusion zones prior to commencement of the activity A 500 m radius exclusion zone around the IMR/heavy well intervention semisubmersible vessel for the duration of activities A 1500 m radius Operational Area around the well

		Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned Risks		
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 issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.4 Email sent to Australian Hydrographic Office and Australian Maritime Safety Authority – Marine Safety (30 August 2021)

Dear AHO / AMSA

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

An information sheet (also on our website), and shipping lane map is attached.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier

Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) and will not anchor/moor on the seabed Vessels will operate 24 hours per day for the duration of the activities

Wellhead location:

Wellhead	Water depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.5 Email sent to Australian Maritime Safety Authority – Marine Pollution (2 September 2021)

Dear [redacted]

As part of Woodside’s ongoing consultation for its current and planned activities, I would like to advise the Australian Maritime Safety Authority (AMSA) that Woodside is preparing the *Eaglehawk-1 Exploration Wellhead*

Decommissioning Environment Plan, located in permit WA-28-P, and would like to offer AMSA 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 *Eaglehawk-1 Exploration Wellhead Decommissioning 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 propose to submit an EP on 22nd October 2021 to support these activities.

Should you require additional information or have a comment to make about the proposed activity, please contact myself by close of business 8th October to allow us sufficient time to inform our activity planning and EP development.

Comments can be made by email, letter or by phone.

Please be aware that your feedback will be communicated to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), as is required under legislation.

We look forward to hearing from you.

Many thanks,

Hydrocarbon Spill Coordinator | Security & Emergency Management

1.6 Email sent to the Department of Agriculture, Water and Environment (30 August 2021)

Dear DAWE

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

Fisheries have been identified as being relevant based on fishing licence overlap with the activity area, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

We have also assessed biosecurity matters which are considered below.

An information sheet (also on our website), and a map of Commonwealth fisheries is attached.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m

Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Relevant Fisheries:	**State:** Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Additional Fisheries: *(*Consultation based on AFMA advice to consult all fisheries with entitlements to fish in the area)*	**Commonwealth:** Southern Bluefin Tuna fishery, Western Tuna and Billfish Fishery, Western Skipjack Fishery
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) and will not anchor/moor on the seabed Vessels will operate 24 hours per day for the duration of the activities

Wellhead location:

Wellhead	Water depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Biosecurity:

With respect to the biosecurity matters, please note the following information below:

Environment description:	
Eaglehawk-1 is located in the Northwest Marine Bioregion in approximately 120 m water depth, approximately 140 m north of Dampier. This wellhead is proposed to be removed. Seabed in the immediate vicinity of the wells is comprised of soft sediments. However, the well is situated within a Key Ecological Feature (KEF). Eaglehawk-1 is within the Ancient coastline at 125 m depth contour KEF.	
Potential IMS risk	***IMS mitigation management***
Introduction or translocation and establishment of invasive marine species to the area via biofouling on vessels or	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.

within vessels ballast water systems.	Vessels will be assessed and managed to prevent the introduction of invasive marine species in accordance with Woodside's Invasive Marine Species Management Plan. Woodside's Invasive Marine Species Management Plan includes a risk assessment process that is applied to vessels undertaking Activities. Based on the outcomes of each IMS risk assessment, Management measures commensurate with the risk (such as the treatment of internal systems, IMS inspections or cleaning) will be implemented to minimise the likelihood of IMS being introduced.

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.7 Email sent to Department of Primary Industries and Regional Development and Western Australian Fishing Industry Council (30 August 2021)

Dear [redacted]

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

Planned activities for Eaglehawk-1 are expected to be completed between 2023-2025 in water depths around 120 m. **A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the IMR/heavy well intervention semisubmersible vessel to manage vessel movements.**

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Fisheries have been identified as being relevant based on fishing licence overlap with the activity area, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
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Duration:	Wellhead removal is expected to take up to 10 days to complete
Relevant Fisheries:	**State:** Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Additional Fisheries: *(*Consultation based on AFMA advice to consult all fisheries with entitlements to fish in the area)*	**Commonwealth:** Southern Bluefin Tuna fishery, Western Tuna and Billfish Fishery, Western Skipjack Fishery
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
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Wellhead Location:

Wellhead	Water depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Potential risks to commercial fishing and proposed mitigation measures:

Eaglehawk-1 wellhead being removed

Potential Risk	Risk Description	Mitigation And / Or Management Measures
Planned		

Physical presence of infrastructure on seafloor causing interference or displacement	Physical presence of infrastructure on the seafloor causing temporary interference / displacement	Wellhead location marked on marine charts until removal completed Wellhead proposed to be removed
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 and Woodside's Environmental Performance Standards where applicable
Seabed disturbance	Disturbance to the seabed from removal activities	Attempted retrieval of dropped objects No anchoring of vessels
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 dates and any exclusion zones prior to commencement of the activity A 500 m radius exclusion zone around the IMR/heavy well intervention semisubmersible vessel for the duration of activities A 1500 m radius Operational Area around the well Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned Risks		
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 issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.8 Email sent to Mobil Australia, Santos, Sapura OMV Upstream, Finder No 9, Fugro Exploration (30 August 2021)

Dear Titleholder

As operator of adjacent titles, we are sending this information to you.

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

An information sheet (also on our website), and Titleholder map is attached.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Please provide your views by 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.9 Email/letter sent to Southern Bluefin Tuna Fishery, Western Tuna and Billfish Fishery and Western Skipjack Fishery (30 August 2021)

Dear Fishery Licence Holder

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

Fisheries have been identified as being relevant based on fishing licence overlap with the activity area, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

You are being contacted on advice from the Australian Fisheries Management Authority (AFMA) to consult all fishery licence holders who have entitlements to fish within the proposed area.

Planned activities for Eaglehawk-1 are expected to be completed between 2023-2025 in water depths around 120 m. **A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the IMR/heavy well intervention semisubmersible vessel to manage vessel movements.**

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
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Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
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Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Potential risks to commercial fishing and proposed mitigation measures:

Eaglehawk-1 wellhead being removed

Potential Risk	Risk Description	Mitigation And / Or Management Measures
Planned		

Physical presence of infrastructure on seafloor causing interference or displacement	Physical presence of infrastructure on the seafloor causing temporary interference / displacement	Wellhead location marked on marine charts until removal completed Wellhead proposed to be removed
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 and Woodside's Environmental Performance Standards where applicable
Seabed disturbance	Disturbance to the seabed from removal activities	Attempted retrieval of dropped objects No anchoring of vessels
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 dates and any exclusion zones prior to commencement of the activity A 500 m radius exclusion zone around the IMR/heavy well intervention semisubmersible vessel for the duration of activities A 1500 m radius Operational Area around the well Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned Risks		
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 issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.10 Email sent to Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery (30 August 2021)

Dear Fishery Licence Holder

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

Planned activities for Eaglehawk-1 are expected to be completed between 2023-2025 in water depths around 120 m. **A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the IMR/heavy well intervention semisubmersible vessel to manage vessel movements.**

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Fisheries have been identified as being relevant based on fishing licence overlap with the activity area, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints

Duration:	Wellhead removal is expected to take up to 10 days to complete
Relevant Fisheries:	**State:** Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
Additional Fisheries: *(*Consultation based on AFMA advice to consult all fisheries with entitlements to fish in the area)*	**Commonwealth:** Southern Bluefin Tuna fishery, Western Tuna and Billfish Fishery, Western Skipjack Fishery
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) and will not anchor/moor on the seabed Vessels will operate 24 hours per day for the duration of the activities

Wellhead Location:

Wellhead	Water depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Potential risks to commercial fishing and proposed mitigation measures:

Eaglehawk-1 wellhead being removed

Potential Risk	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure on seafloor causing interference or displacement	Physical presence of infrastructure on the seafloor causing temporary interference / displacement	Wellhead location marked on marine charts until removal completed Wellhead proposed to be removed
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	All routine marine discharges will be managed according to legislative and regulatory requirements and Woodside’s Environmental Performance Standards where applicable

	diluted and dispersed in the water column	
Seabed disturbance	Disturbance to the seabed from removal activities	Attempted retrieval of dropped objects No anchoring of vessels
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 dates and any exclusion zones prior to commencement of the activity A 500 m radius exclusion zone around the IMR/heavy well intervention semisubmersible vessel for the duration of activities A 1500 m radius Operational Area around the well Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned Risks		
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 issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards

Senior Corporate Affairs Adviser | Operations

1.11 Email sent to Pearl Producers Association (30 August 2021)

Dear [redacted]

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

Planned activities for Eaglehawk-1 are expected to be completed between 2023-2025 in water depths around 120 m. **A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the IMR/heavy well intervention semisubmersible vessel to manage vessel movements.**

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

An information sheet (also on our website), and a map of relevant fisheries is attached.

Fisheries have been identified as being relevant based on fishing licence overlap with the activity area, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Relevant Fisheries:	**State:** Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line Fishery
*Additional Fisheries: (*Consultation based on AFMA advice to consult all fisheries with entitlements to fish in the area)*	**Commonwealth:** Southern Bluefin Tuna fishery, Western Tuna and Billfish Fishery, Western Skipjack Fishery

Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) and will not anchor/moor on the seabed Vessels will operate 24 hours per day for the duration of the activities

Wellhead Location:

Wellhead	Water depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Potential risks to commercial fishing and proposed mitigation measures:

Eaglehawk-1 wellhead being removed

Potential Risk	Risk Description	Mitigation And / Or Management Measures
Planned		
Physical presence of infrastructure on seafloor causing interference or displacement	Physical presence of infrastructure on the seafloor causing temporary interference / displacement	Wellhead location marked on marine charts until removal completed Wellhead proposed to be removed
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 and Woodside’s Environmental Performance Standards where applicable
Seabed disturbance	Disturbance to the seabed from removal activities	Attempted retrieval of dropped objects No anchoring of vessels
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 dates and any exclusion zones prior to commencement of the activity A 500 m radius exclusion zone around the IMR/heavy well intervention semisubmersible vessel for the duration of activities A 1500 m radius Operational Area around the well Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area
Unplanned Risks		
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 issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Regards
Senior Corporate Affairs Adviser | Operations

1.12 Email sent to Karratha Community Liaison Group (30 August 2021)

Dear Karratha Community Liaison Group

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Best regards,
Corporate Affairs Adviser | Corporate Affairs Karratha

1.13 Email sent to Karratha and District Chamber of Commerce and Industry (KDCCI) (30 August 2021)

Dear [redacted]

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Best regards,
Corporate Affairs Adviser | Corporate Affairs Karratha

1.14 Email sent to City of Karratha (30 August 2021)

Good afternoon [redacted]

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Best regards,
Corporate Affairs Adviser | Corporate Affairs Karratha

1.15 Email sent to Ngarluma Aboriginal Corporation (30 August 2021)

Dear [redacted]

I hope this email finds you both well.

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete

Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Kind regards,
Senior Corporate Affairs Advisor - Indigenous Affairs | Corporate Affairs

1.16 Email sent to Wirrawandi Aboriginal Corporation (30 August 2021)

Dear [redacted]

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier

Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Kind regards
Senior Corporate Affairs Advisor - Indigenous Affairs | Corporate Affairs

1.17 Email sent to Murujuga Aboriginal Corporation (31 August 2021)

Dear [redacted]

Following on from our discussion this morning, and noting you may have received through the CLG, please find detail regarding Eaglehawk-1 Wellhead.

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

Whilst the name of the exploration wellhead is Eaglehawk-1, please note that the wellhead is 127 km north of Eaglehawk Island.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Kind regards
Senior Corporate Affairs Advisor - Indigenous Affairs | Corporate Affairs

1.18 Email sent to Wong-Goo-Tt-Oo (31 August 2021)

Dear [redacted]

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet is attached, which provides background on the proposed activity, including a summary of potential key risk and associated management measures. The Information Sheet is also available on our website.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km northwest of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the Inspection, maintenance and repair vessel (IMR)/heavy well intervention semisubmersible vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support The vessels will operate on dynamic positioning (DP) 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 this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 29 September 2021.

Kind regards,
Senior Corporate Affairs Adviser - Heritage | Corporate Affairs

1.19 Woodside Consultation Information Sheet (sent to all relevant stakeholders)

Woodside

STAKEHOLDER CONSULTATION

INFORMATION SHEET

August 2021

EAGLEHAWK-1 EXPLORATION WELLHEAD DECOMMISSIONING ENVIRONMENT PLAN

CARNARVON BASIN, NORTH-WEST AUSTRALIA

Woodside is planning to decommission the Eaglehawk-1 exploration wellhead, located in permit WA-28-P around 136 km northwest of Dampier at a water depth of approximately 120 m.

The Eaglehawk-1 exploration wellhead is proposed to be removed between 2023- 2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints, and is expected to take approximately 10 days to complete.

Woodside Energy Ltd is Operator of WA-28-P (15.78%) with joint venture participants Shell Australia Pty Ltd (15.78%), BHP Petroleum (North West Shelf) Pty Ltd (15.78%), BP Developments Australia Pty Ltd (15.78%), Chevron Australia Pty Ltd (15.78%), Japan Australia LNG (MIMI) Pty Ltd (15.78%), and CNOOC NWS Private Ltd (5.32%).

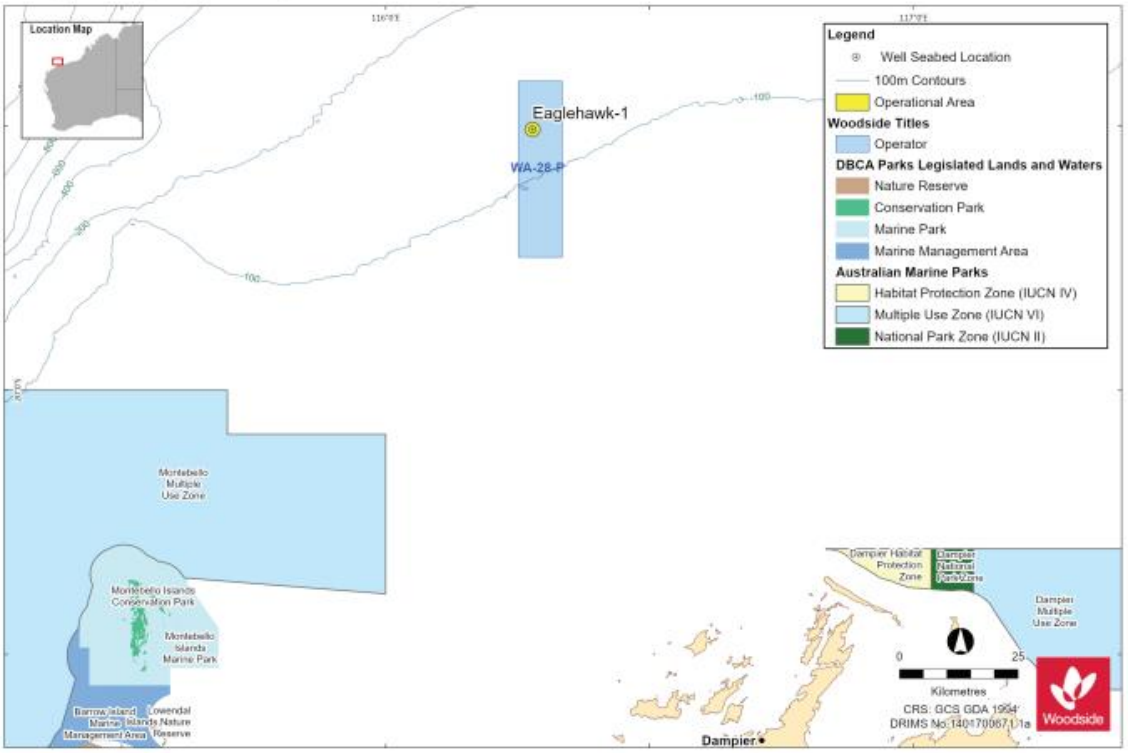


Figure 1 Petroleum Activity Program Operation Area - Eaglehawk-1 Wellhead

Table 1 – Activity summary

Exploration Wellhead Removal Activities	
Commencement date	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Estimated duration	Wellhead removal is expected to take approximately 10 days to complete
Water depth	- 120 m
Infrastructure	Exploration wellhead Permanent and temporary guidebases
Vessels	Inspection, maintenance and repair vessel (IMR) or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery Support vessels including anchor handling tug(s) (AHT) and general supply/support
Distance to nearest town	- 136 km northwest of Dampier
Distance to nearest marine park	- 70 km northeast of the Montebello Marine Park - Multiple Use Zone (Cwlth)

Table 2 – Approximate Location

Wellheads	Water Depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	-120	19° 30' 22.199" S	116° 16' 41.386" E	Temporary 500m radius	WA-28-P

Proposed activity

Woodside has undertaken a comprehensive assessment of decommissioning options for the Eaglehawk-1 wellhead considering water depth, interaction with other marine users, previous removal attempts, international and Australian standards and a comparison of the impacts and risks associated with executing the decommissioning options.

The well has been permanently plugged for abandonment to eliminate the possibility of hydrocarbon release to the environment. Activities will include removal of the wellhead as well as temporary and permanent guide bases using an abrasive water jet cutting method. Removal and recovery will be completed from either an IMR vessel or a heavy well intervention semisubmersible vessel. The vessels will operate on dynamic positioning (DP) and will not anchor/moor on the seabed.

Vessels will operate 24 hours per day for the duration of the activities. The duration of these activities is subject to change due to project schedule requirements, vessel availability, weather or unforeseen circumstances. It is estimated it will take approximately 10 days to complete the removal and recovery activity.

Communications with mariners

A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the IMR/heavy well intervention semisubmersible vessel to manage vessel movements.

Marine notices will be issued prior to activity commencement to alert vessels which may be operating in waters nearby.

Implications for Stakeholders

Woodside will consult relevant stakeholders whose interests, functions and activities may be affected by the proposed activities. We will also keep other stakeholders who have identified an interest in the activities informed about our planned activities.

Woodside has undertaken an assessment to identify potential risks to the marine environment and relevant stakeholders considering timing, duration, location and potential impacts arising from wellhead removal activities.

A number of mitigation and management measures for the removal of the Eaglehawk-1 wellhead is outlined in Table 3. Further details will be provided in the Environment Plan.

Table 3. Summary of key risks and/or impacts and management measures for the Eaglehawk-1 wellhead being removed

Exploration wellhead activities	Mitigation and/or Management Measure
Planned	
Physical presence of infrastructure on seafloor causing interference or displacement	• Wellhead location marked on marine charts until removal completed. • Wellhead proposed to be removed.
Chemical use	• Chemical use will be managed in accordance with Woodside and contractor chemical selection and approval procedures.
Interests of relevant stakeholders including: • Defence activities • Petroleum activities • Commercial and recreational fishing activities • Shipping activities	• Consultation with relevant petroleum titleholders, commercial fishers and their representative organisations, and Government departments and agencies to inform decision making for the proposed activity and development of the Environment Plan. • Advice to relevant stakeholders prior to the commencement of activities.
Marine discharges	• All routine marine discharges will be managed according to legislative and regulatory requirements and Woodside's Environmental Performance Standards where applicable.
Seabed disturbance	• Attempted retrieval of dropped objects. • No anchoring of vessels.
Vessel interaction	• 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 dates and any exclusion zones prior to commencement of the activity. • A 500 m radius exclusion zone around the IMR/heavy well intervention semisubmersible vessel for the duration of activities. • A 1500 m radius Operational Area around the well. • Commercial fishers and other marine users are permitted to use but should take care when entering the Operational Area.
Waste generation	• Waste generated on the vessels will be managed in accordance with legislative requirements and a Vessel Waste Management Plan. • Wastes will be managed and disposed of in a safe and environmentally responsible manner that prevents accidental loss to the environment. • Wastes transported onshore will be sent to appropriate recycling or disposal facilities by a licensed waste contractor.
Emissions to atmosphere	• Standard vessel operations.
Unplanned	
Hydrocarbon release	• 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.
Introduction of invasive marine species	• All vessels will be assessed and managed as appropriate to prevent the introduction of invasive marine species. • Compliance with Australian biosecurity requirements and guidance.
Marine fauna interactions	• Vessel masters will implement interaction management actions in accordance with the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth).

Providing Feedback

Our intent is to minimise environmental and social impacts associated with the proposed activities, and we are seeking any interest or comments you may have to inform our decision making.

If you would like to comment on the proposed activities outlined in this information sheet, or would like additional information, please contact Woodside before 29 September 2021.

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 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).

www.woodside.com.au

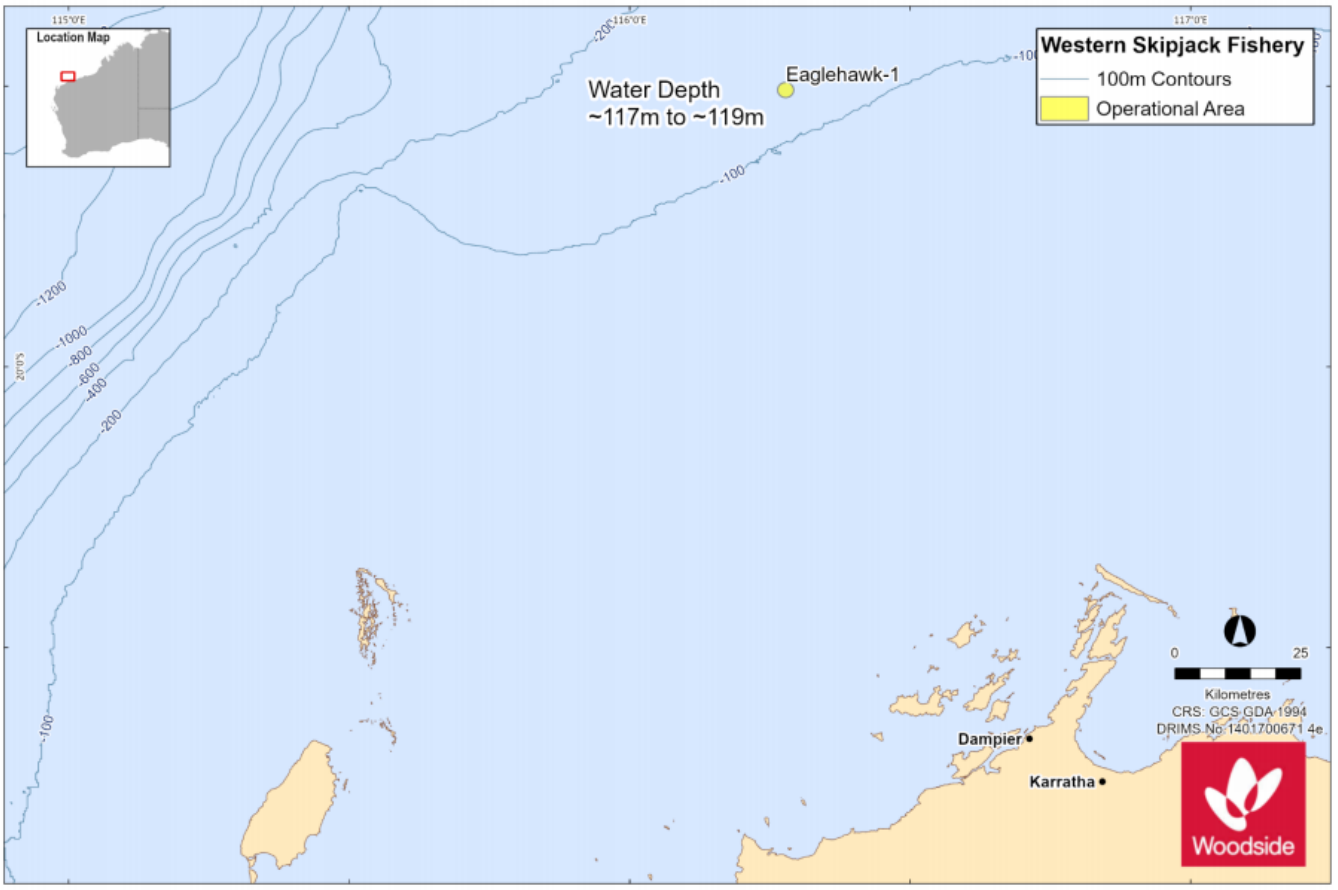
Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

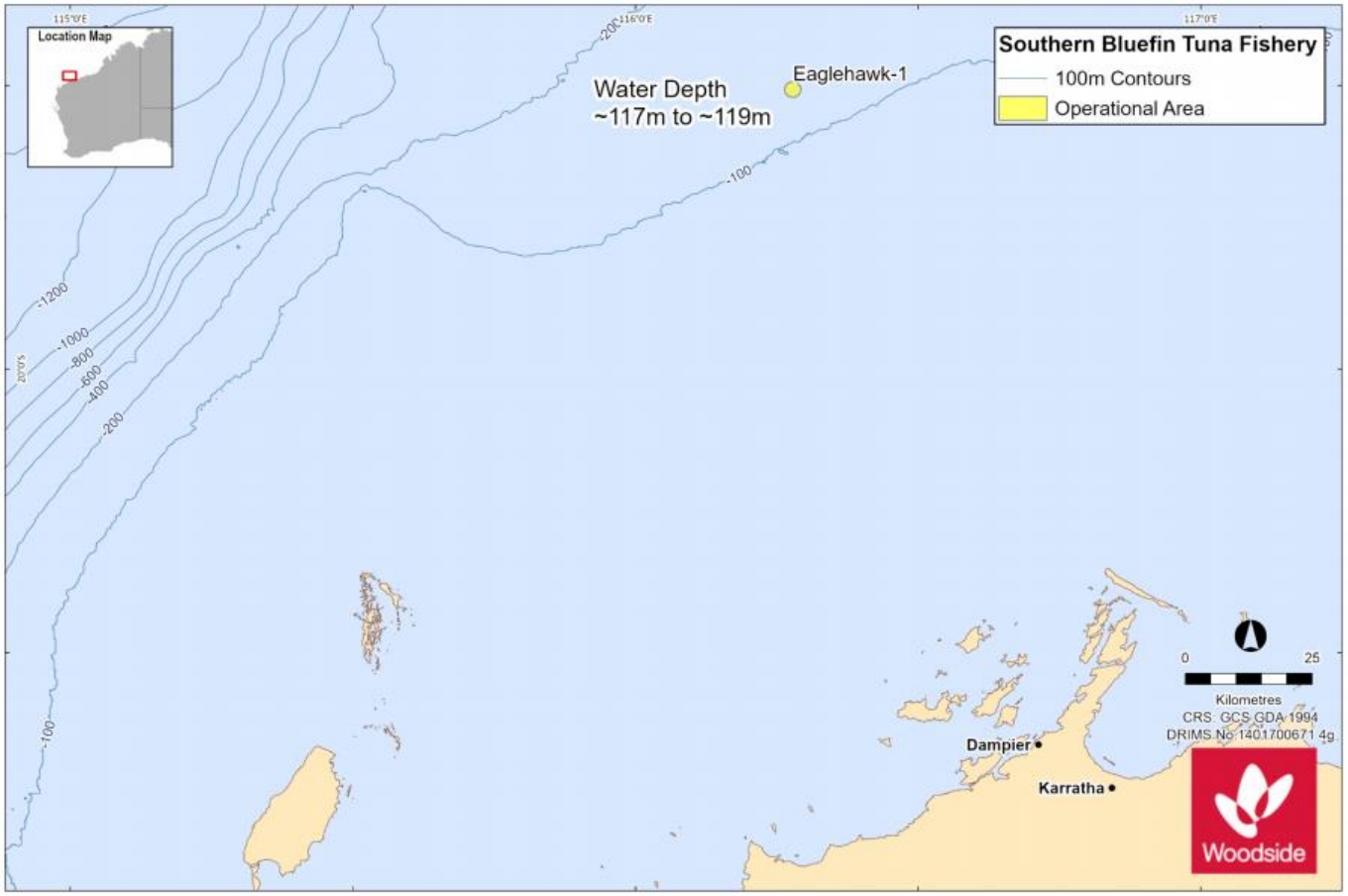
Shannen Wilkinson, Senior Corporate Affairs Adviser
Woodside Energy Ltd
E: Feedback@woodside.com.au | Toll free: 1800 442 977

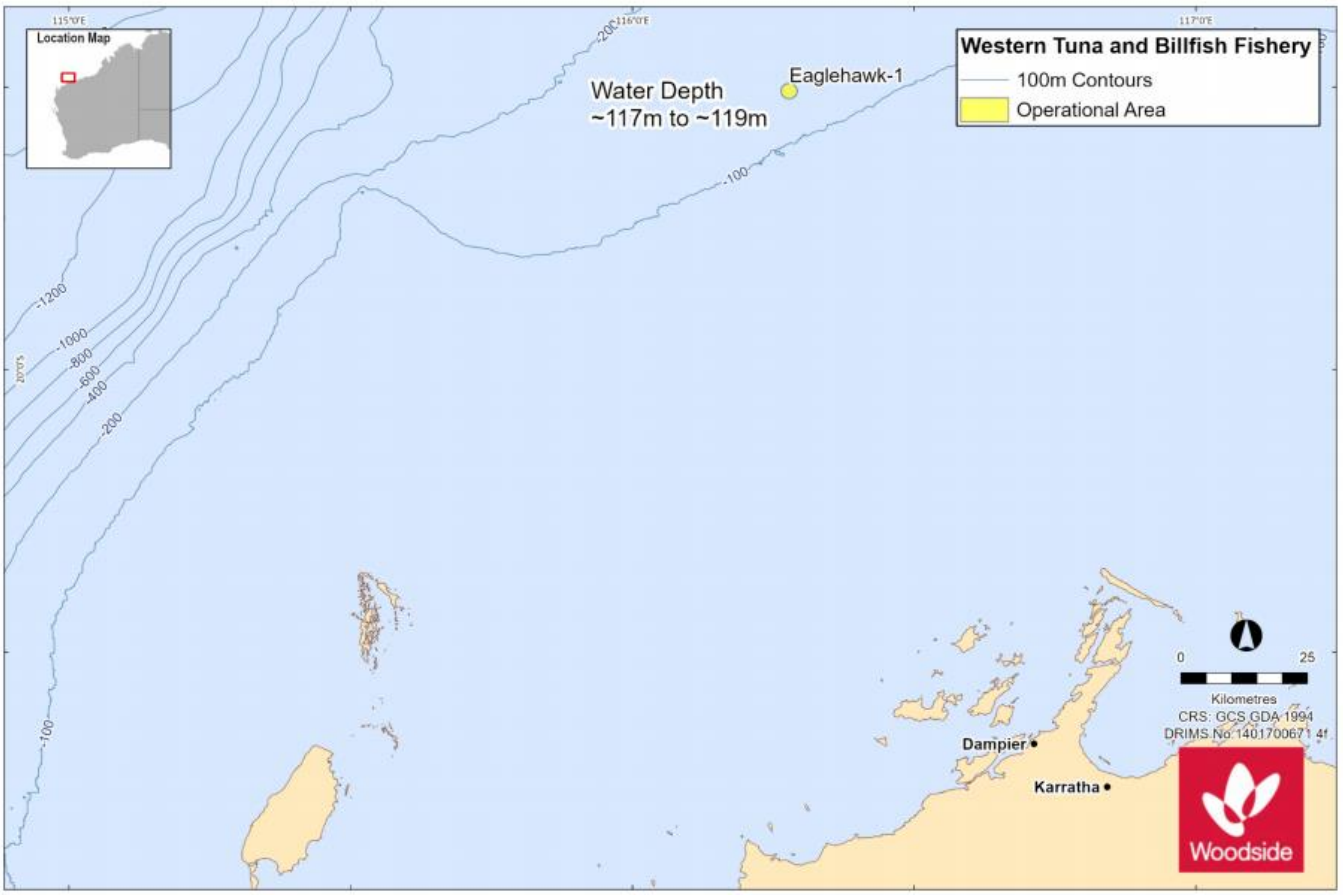
Please note that stakeholder feedback will be communicated to NOPSEMA as required under legislation. Woodside will communicate any material changes to the proposed activity to affected stakeholders as they arise.

Woodside

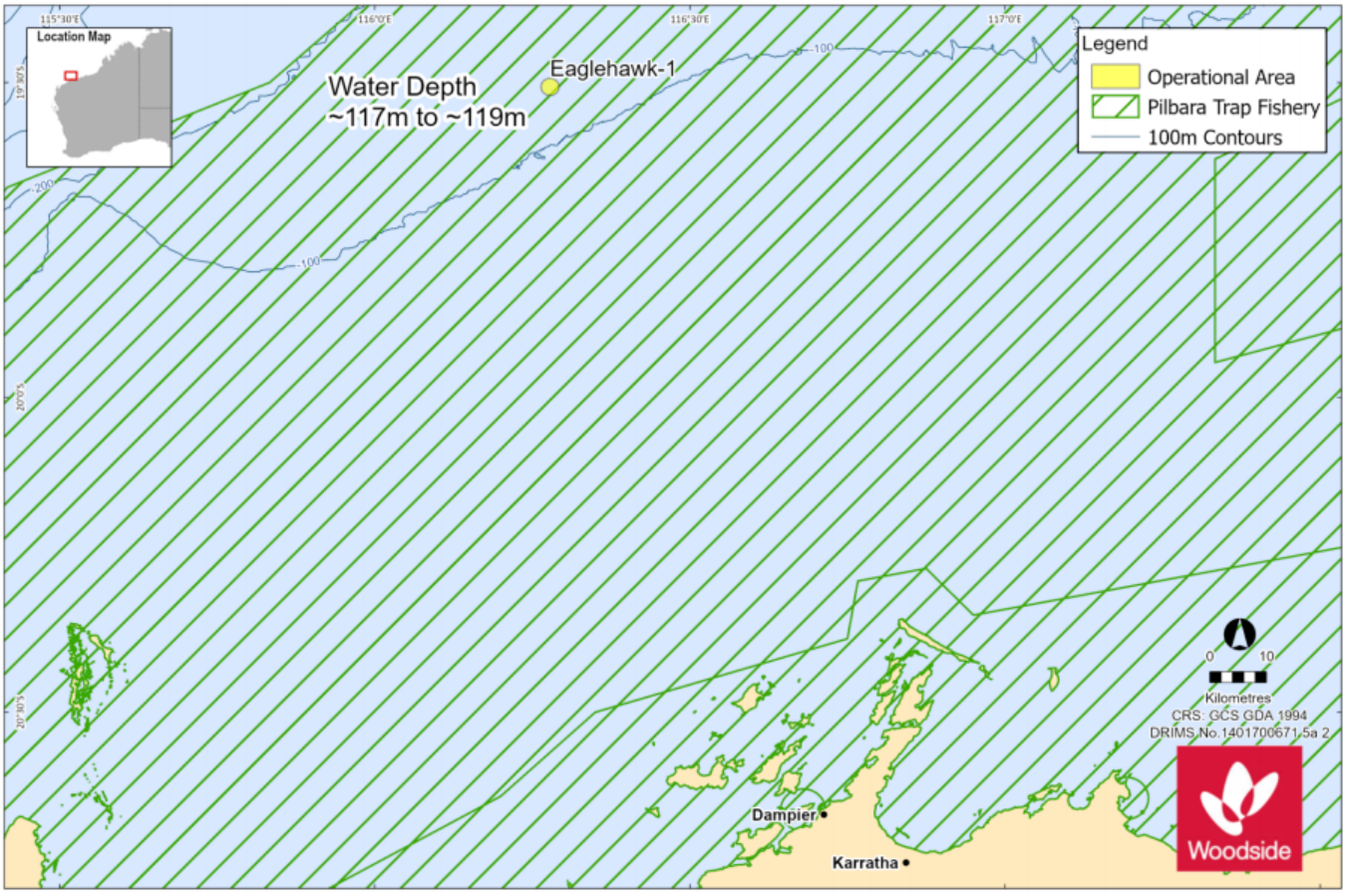
1.20 Fisheries map sent to AFMA, DAWE, DPIRD, WAFIC, SBTIA, CFA, Southern Bluefin Tuna Fishery, Western Tuna and Billfish Fishery and Western Skipjack Fishery (30 August 2021)

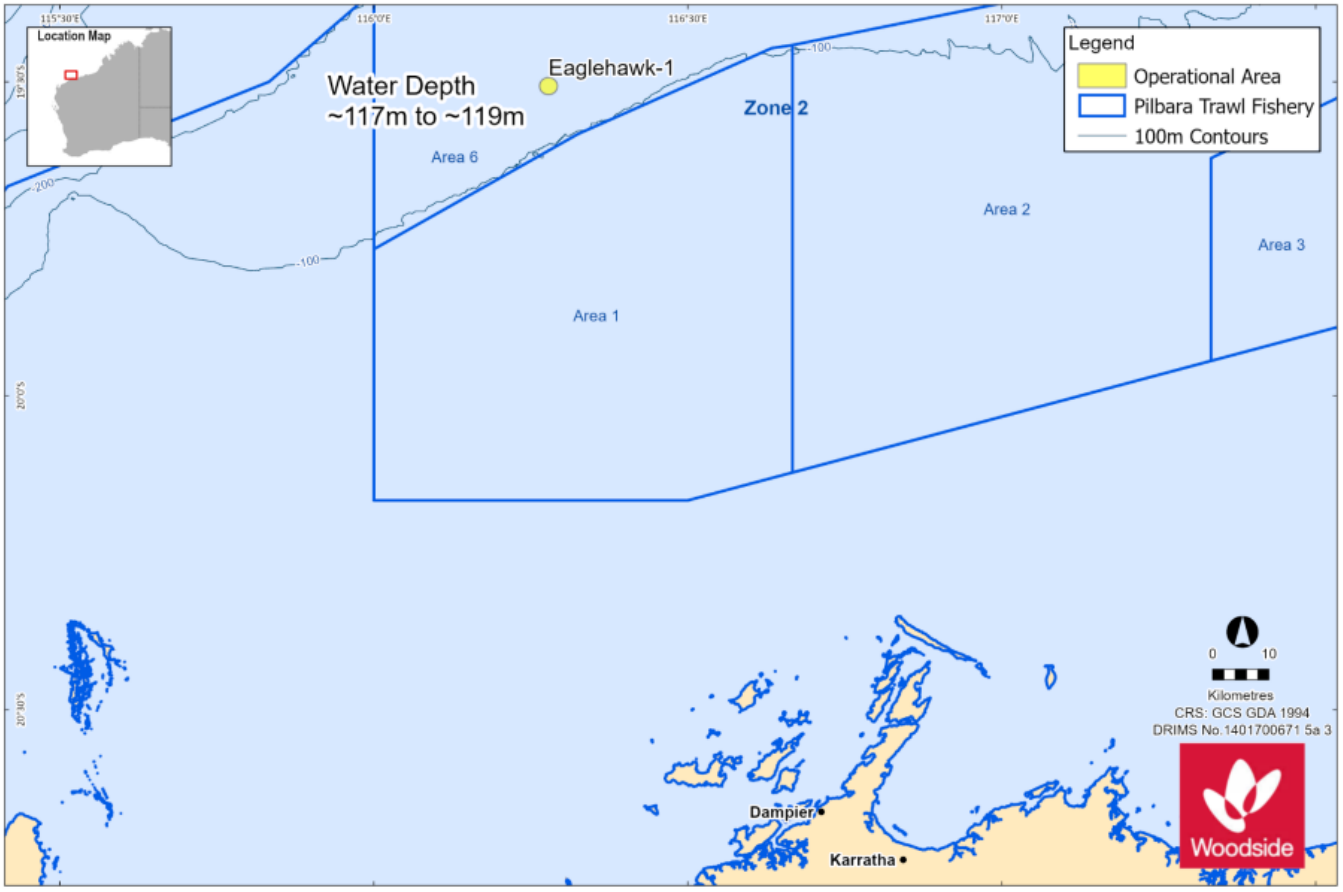


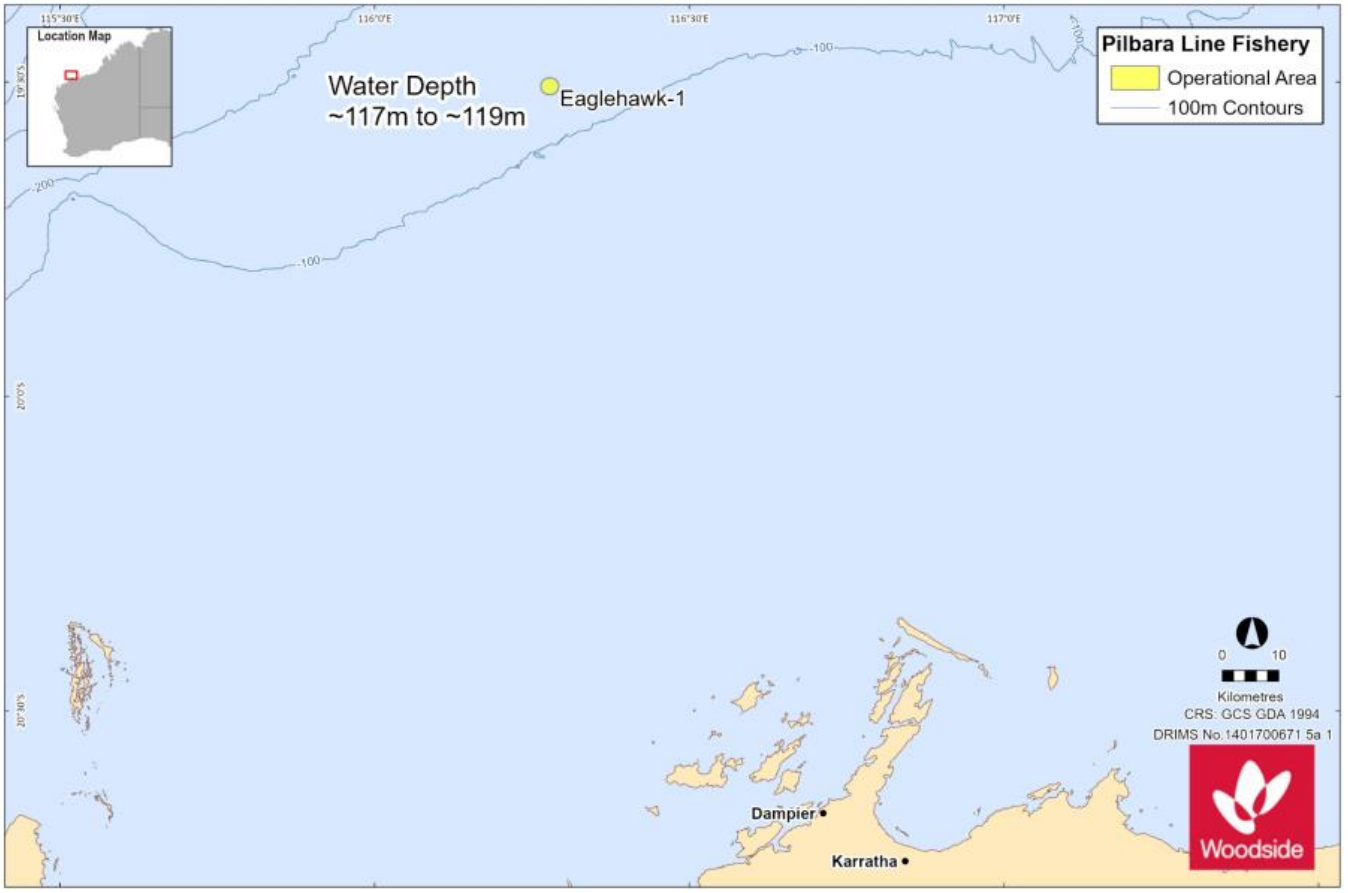




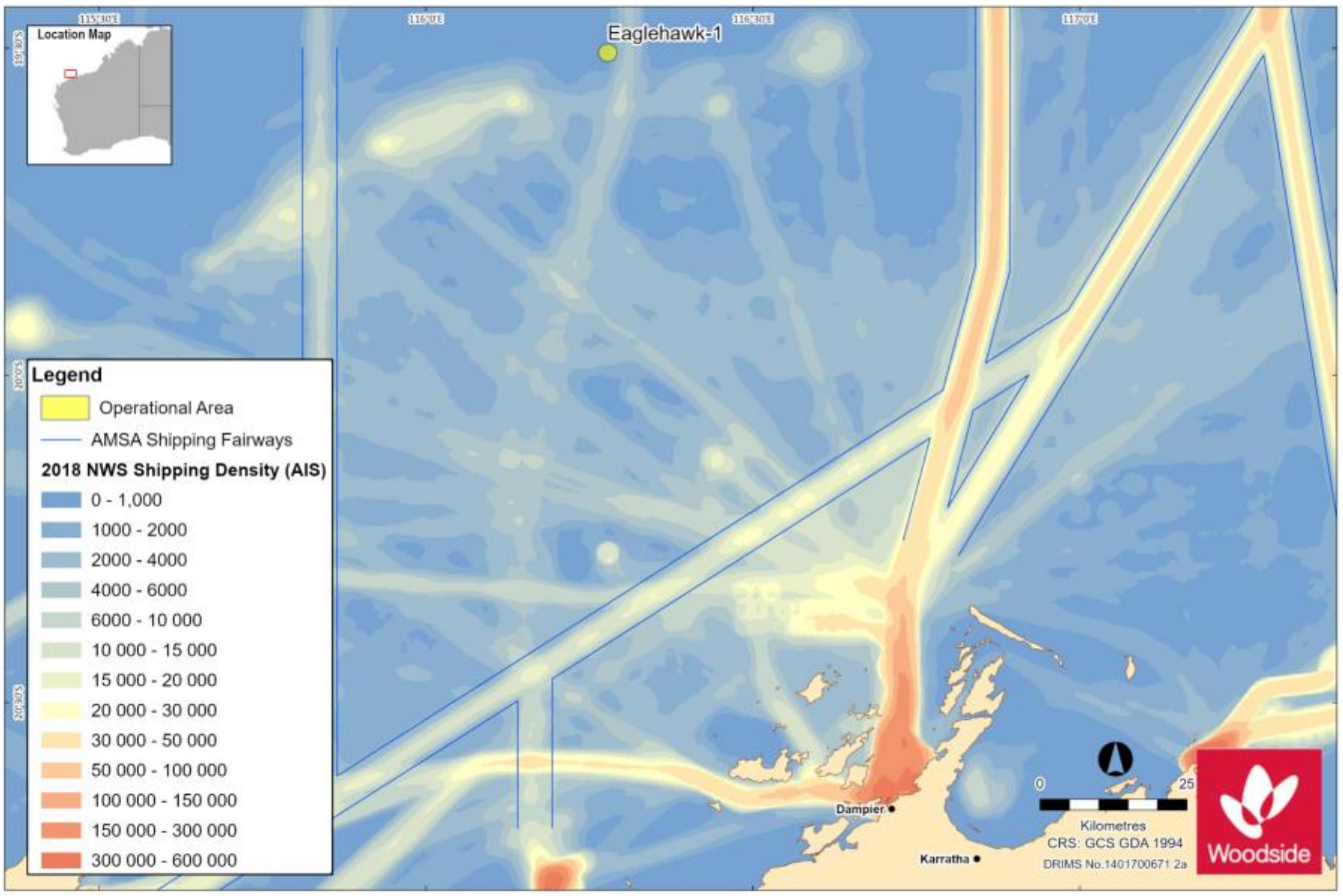
1.21 Fisheries map sent to DPIRD, WAFIC, PPA, Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line Fishery (30 August 2021)



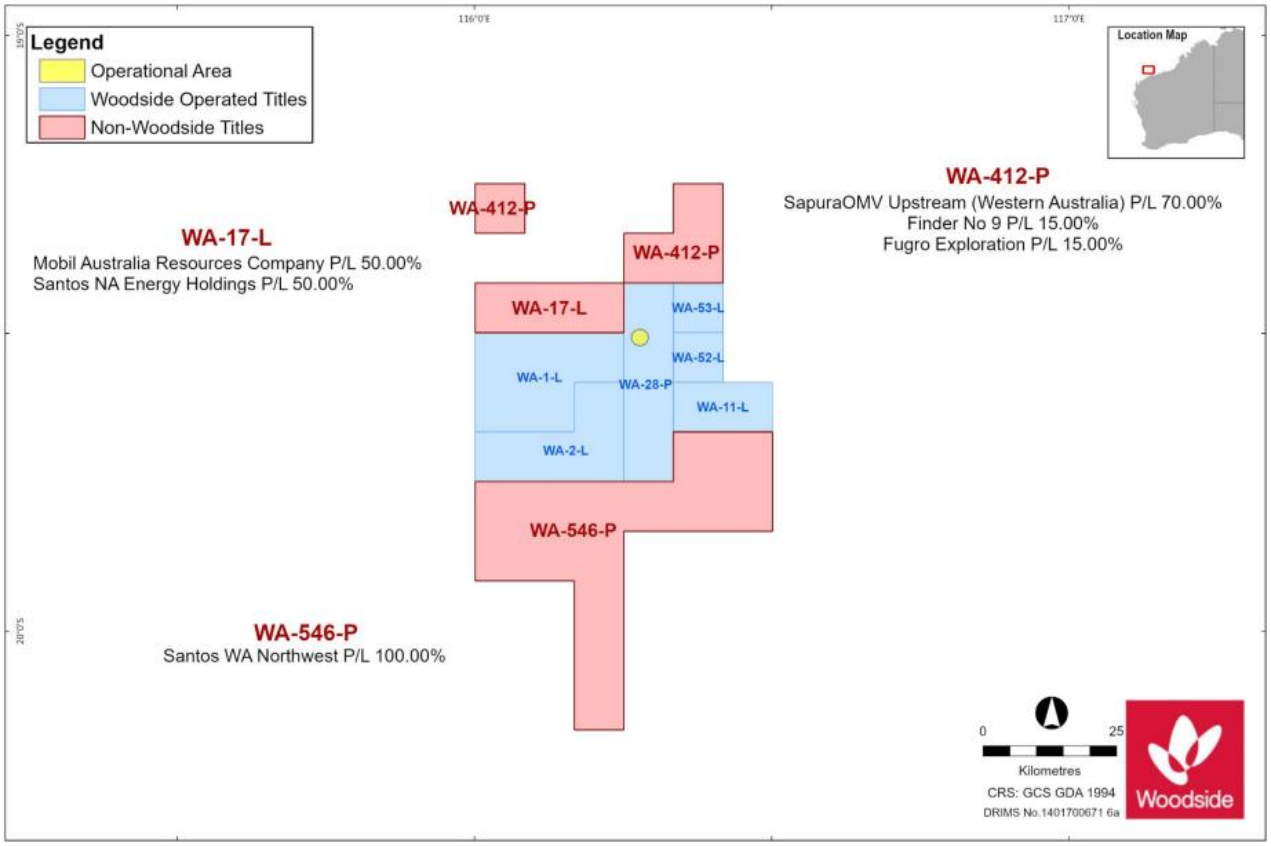

Location Map
Water Depth
~117m to ~119m
Eaglehawk-1
Zone 2
Area 6
Area 2
Area 3
Area 1
Legend
Operational Area
Pilbara Trawl Fishery
100m Contours
Dampier
Karratha
0
10
Kilometres
CRS: GCS GDA 1994
DRIMS No.1401700671.5a 3
Woodside


Location Map
Water Depth
~117m to ~119m
Eaglehawk-1
Pilbara Line Fishery
Operational Area
100m Contours
Dampier
Karratha
0
10
Kilometres
CRS: GCS GDA 1994
DRIMS No.1401700671.5a 1
Woodside

1.22 Shipping lane map sent to AHO and AMSA (30 August 2021)



1.23 Titleholder map sent to Mobil Australia, Santos, Sapura OMV Upstream, Finder No 9, Fugro Exploration (30 August 2021)



1.24 Email sent to Director of National Parks (15 November 2021)

Dear Director of National Parks

Woodside is planning to submit an Environment Plan for the decommissioning of the Eaglehawk-1 exploration wellhead, located in permit WA-28-P.

A Consultation Information Sheet about the planned activity is attached, which provides background on the activity, including a summary of potential key risks and associated management measures. The Information Sheet is also available on our website.

We note Australian Government Guidance on consultation activities and confirm that:

- The proposed activities are outside the boundaries of a proclaimed Australian Marine Park, with activities taking place approximately 71 km north east of the Montebello Marine Park Multiple Use Zone.
- We have assessed potential risks to Australian Marine Parks (AMPs) in the development of the proposed Environment Plan for this activity and believe that there are no credible risks as part of planned activities that have potential to impact the values of the Marine Parks.
- The worst-case credible spill scenario assessed in this Environment Plan is the remote likelihood event of a vessel collision resulting a spill of marine diesel to the marine environment. Through review of hydrocarbon spill modelling, and with consideration of a 10 ppb dissolved and entrained hydrocarbon threshold, the following AMPs may be contacted in the event of a spill:
    - Argo-Rowley Terrace
    - Carnarvon Canyon
    - Gascoyne
    - Montebello
    - Ningaloo
- A Commonwealth Government-approved oil spill response plan will be in place for the duration of the activities, which includes 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.

Activity:

Summary:	Exploration wellhead, permanent and temporary guidebases to be removed
Location:	~136 km north west of Dampier
Approx. Water Depth (m):	~120 m
Schedule:	Planned activities are expected to be completed between 2023-2025. Timing of removal and recovery is subject to approvals, vessel availability and weather constraints
Duration:	Wellhead removal is expected to take up to 10 days to complete
Exclusionary/Cautionary Zone:	A 1500 m radius Operational Area will apply around the Eaglehawk-1 well during the activities. This includes a temporary 500 m exclusion zone around the vessel to manage vessel movements
Vessels:	IMR or heavy well intervention semisubmersible vessel may be used for infrastructure removal and recovery

Support vessels including anchor handling tug(s) (AHT) and general supply/support
The vessels will operate on dynamic positioning (DP) and will not anchor/moor on the seabed
Vessels will operate 24 hours per day for the duration of the activities

Wellhead location:

Wellhead	Water depth (m)	Latitude	Longitude	Exclusion Zones	Permit Area
Eaglehawk-1	~120	19° 30’ 22.199” S	116° 16’ 41.386” E	Temporary 500 m radius	WA-28-P

Feedback:

If you have any issues or concerns with these activities, or any other issues relevant to this location then please respond to Woodside at: Feedback@woodside.com.au or +61 438 173 562

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 **15 December 2021**.

Kind regards,

APPENDIX G: DEPARTMENT OF PLANNING, LAND, HERITAGE, AND ABORIGINAL ENQUIRY SYSTEM RESULTS

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

No Registered Aboriginal Sites in Custom search area - Point with 500m buffer - 116.278055578573°E, 19.5060832142472°S (GDA94)

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

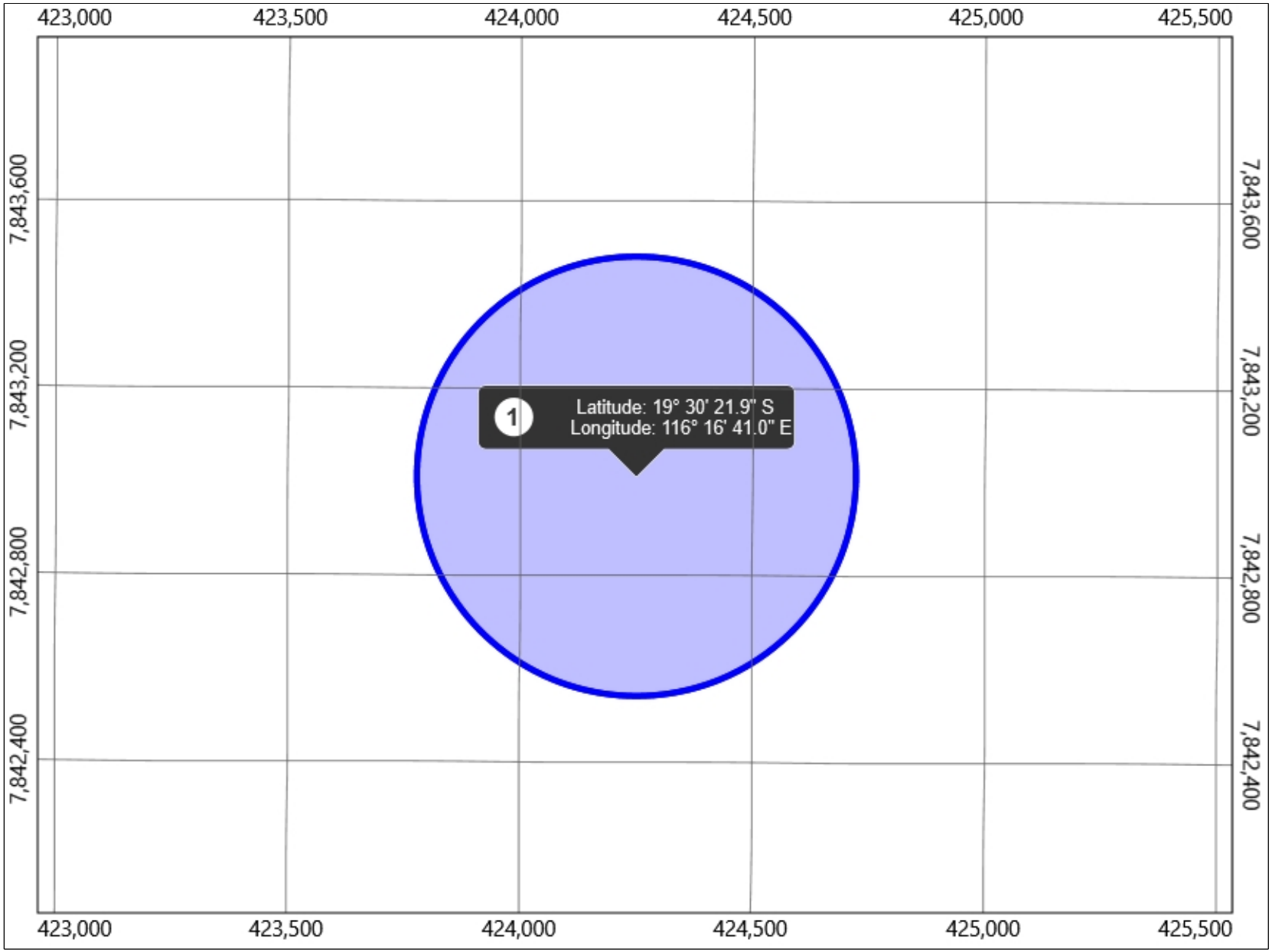
Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

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

0.44 kilometres

Map Scale 1 : 13,200

MGA Zone 50 (GDA94)

APPENDIX H: FIRST STRIKE PLAN

Eaglehawk-1 Exploration Wellhead Oil Pollution First Strike Plan

Security & Emergency Management

Hydrocarbon Spill Preparedness

November 2021
Revision 0

TABLE OF CONTENTS

EAGLEHAWK-1 EXPLORATION WELLHEAD OIL POLLUTION FIRST STRIKE PLAN

SPILL FROM VESSEL ENTERING STATE WATERS *(Note: SOPEP should be implemented in conjunction with this document)*	**LEVEL 1**	
	CONTROL AGENCY:	**WA DoT**
	INCIDENT CONTROLLER:	**VESSEL MASTER (with response assistance from Woodside)**
	LEVEL 2 & 3	
	CONTROL AGENCY:	**WA DoT**
	INCIDENT CONTROLLER:	**WA DoT**

SPILL FROM VESSEL ENTERING COMMONWEALTH WATERS *(Note: SOPEP should be implemented in conjunction with this document)*	**LEVEL 1**	
	CONTROL AGENCY:	**AMSA**
	INCIDENT CONTROLLER:	**VESSEL MASTER (with response assistance from Woodside)**
	LEVEL 2 & 3	
	CONTROL AGENCY:	**AMSA**
	INCIDENT CONTROLLER:	**AMSA (with response assistance from Woodside)**

Guidance to Oil Spill Incident Levels

The most significant characteristic of the below guidance should be considered when determining level or escalation potential.

Characteristic	Level 1 Indicators	Level 2 Indicators	Level 3 Indicators
General Description	Generally able to be resolved within 24-48 hours.	Generally, a response is required beyond 48 hours.	Response may extend beyond weeks.
Woodside Emergency Management (EM)/Crisis Management Team (CMT) Activation	Onsite Incident Controller (IC) activated. Use of Incident Coordination Centre (ICC) support may be required.	Handover of Control from Onsite IC to Corporate Incident Coordination Center (CICC) Duty Manager (DM) in Peth.	Includes Perth based CMT activation.
Number of Agencies	First-response agency and Incident Management Team (IMT).	Multi-agency response.	Agencies from across government and industry.
Environment	Isolated impacts or with natural recovery expected within weeks.	Significant impacts and recovery may take months.	Significant area and recovery may take months. Remediation required.
Economy	Business level disruption (i.e. Woodside).	Business failure or 'Channel' impacts.	Disruption to a sector.
Public Affairs	Local and regional media coverage (Western Australia (WA)).	National media coverage.	International media coverage.

For guidance on credible spill scenarios and hydrocarbon characteristics refer to Appendix A.

For Spills Entering State Waters

In the event of a spill where Woodside is the responsible party and the spill may impact State waters/shorelines, Woodside will notify the Western Australian Department of Transport (DoT).

If the spill arising from a vessel impacts State waters/shorelines DoT is the Control Agency.. DoT will appoint an Incident Controller and form a separate IMT to manage the State waters/shorelines response only. The coordination structure for a concurrent hydrocarbon spill in both Commonwealth and State waters/shorelines is shown in Appendix E.

Initially Woodside will be required to make available an appropriate number of suitably qualified persons to work in the DoT IMT (see Appendix G). DoT's role as the Controlling Agency for Level 2 and 3 spills in State waters/shorelines 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/shorelines 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):

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 G.

Response Process Overview

Use the below to determine actions required and which parts of this plan are relevant to the incident.	
For guidance on credible scenarios and hydrocarbon characteristics, refer to Appendix A.	
ALL INCIDENTS	Notify the Woodside Communication Centre (WCC) on: 1300 833 333, +61 8 9348 7184 / 4624 or sat phone +881 632 410 392
	Incident Controller or delegate to make relevant notifications in Table 1-1 of this Oil Pollution First Strike Plan.
LEVEL 1	**VESSEL INCIDENT**
	Upon agreement with AMSA: 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 1300 833 333, +61 8 9348 7184 / 4624 or sat phone +881 632 410 392 and escalate to a level 2/3 incident.
LEVEL 2/3	**VESSEL INCIDENT**
	Handover control to AMSA and stand up CICC to assist.
	If requested by AMSA: Undertake quick revalidation of the recommended strategies on Table 3-1 taking into consideration seasonal sensitivities and current situational awareness. Undertake validated strategies.
	If requested by AMSA: Create an IAP for all ongoing operational periods (Link). **The content of the IAP should reflect the selected response strategies based on current situational awareness.** For the full detailed pre-operational NEBA (Link)

1. NOTIFICATIONS (ALL LEVELS)

The Incident Controller or delegate must ensure the below notifications (**Table 1-1**) are completed within the designated timeframes.

For other environmental notifications required refer to the Eaglehawk-1 Exploration Wellhead Environment Plan (Link)

Table 1-1: Immediate Notifications

Notification timing	Responsibility	Authority/ Company	Name	Contact Number	Instruction	Form/ Template	Mark Complete (✓)
Notifications to be made for ALL LEVELS of spill *(For spills from a vessel the following notifications must be undertaken by a WEL representative).*							
Immediately	Vessel Master	Woodside Communication Centre (WCC)	Duty Manager	[redacted]	Verbally notify WCC of event and estimated volume and hydrocarbon type.	Verbal	
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.	App B Form 3	
Within 2 hours	Offshore Installation Manager (OIM) or Woodside Site Rep (WSR)	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	App B Form 1	

[1] Notification to NOPSEMA must be from a Woodside Representative.

Notification timing	Responsibility	Authority/ Company	Name	Contact Number	Instruction	Form/ Template	Mark Complete (✓)
					practicable (cc to NOPTA and DMIRS).		
Within 3 days	WSR, CICC 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]	App B Form 2	
As soon as practicable	CICC DM or Delegate	Woodside	Environment Duty Manager	As per roster	Verbally notify Environment Duty Manager of event and seek advice on relevant performance standards from EP	Verbal	
As soon as practicable	CICC DM or Delegate	Department of Agriculture, Water and the Environment (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. The 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.	Verbal	
ADDITIONAL LEVEL 2/3 NOTIFICATIONS							

Notification timing	Responsibility	Authority/ Company	Name	Contact Number	Instruction	Form/ Template	Mark Complete (✓)
As soon as practicable	CICC DM or Delegate	AMOSC	AMOSC Duty Manager	[redacted]	Notify AMOSC that a spill has occurred and follow-up with an email from the **IC/CICC DM and CMT Leader** to formally activate AMOSC. Determine what resources are required consistent with the AMOSPlan and detail in a Service Contract that will be sent to Woodside from AMOSC upon activation.	App B Form 4	
As soon as practicable	CICC 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 notification form to OSRL as soon as practicable. For mobilisation of resources, send the Mobilisation Form to OSRL as soon as practicable.	Notification: App B Form 6a Mobilisation: App B Form 6b	
As soon as practicable or if spill is likely to extend into WA State waters.	CICC DM or Delegate	WA Department of Transport	DOT Duty Manager	[redacted]	Marine Duty Manager to verbally notify DoT that a spill has occurred and, if required, request use of equipment stored in the Karratha supply shed (which is the closest DoT stockpile for this activity). 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.	App B Form 5	

Notification timing	Responsibility	Authority/ Company	Name	Contact Number	Instruction	Form/ Template	Mark Complete (✓)
As soon as practicable if there is potential for oiled wildlife or the spill is expected to contact land or waters managed by WA Department of Biodiversity, Conservation and Attractions	CICC DM or Delegate	WA Department of Biodiversity, Conservation and Attractions (DBCA)	Duty Officer	[redacted]	Phone call notification	Verbal	
As soon as practicable	CICC 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. LEVEL 1 RESPONSE

2.1 Mobilisation of Response Techniques

For the relevant hydrocarbon type, undertake quick revalidation of the recommended techniques and pre-identified tactics indicated with a 'Yes' in **Table 2-1.** Undertake all validated pre-identified tactics immediately. These tactics should be carried out using the associated plan identified under **Table 2-1** Operational Plan column.

All response techniques and pre-identified tactics have been identified from the pre-operational Net Environmental Benefits Analysis (NEBA) presented in Appendix D of the Eaglehawk-1 Wellhead Decommissioning Environment Plan (Woodside's Oil Spill Preparedness and Response Mitigation Assessment for Eaglehawk-1 Wellhead Decommissioning Environment Plan).

Table 2-1: Level 1 Response Summary

Response Techniques	Hydrocarbon type Marine Diesel Oil (MDO)	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Complete	Link to Operational Plans for notification numbers and actions
Monitor and evaluate – tracking buoy (OM02)	Yes	Coordinate deployment of satellite tracking buoy immediately from vessel If a surface sheen is visible from the facility, deploy the satellite tracking buoy within two hours	OIM/ Operations	**DAY 1:** Tracking buoy deployed within two hours		Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk - OM02 of The Operational Monitoring Operational Plan (Link). Deploy tracking buoy in accordance with Appendix D - Tracking Buoy Deployment Instructions
Please consider instructing the CICC DM to activate or implement any of the following Pre-Identified tactics. The following tactics will assist in answering the '7 Questions of Spill Assessment' identified in APPENDIX C – 7 Questions of spill assessment to increase situational awareness.						
Monitor and evaluate – predictive modelling (OM01)	Yes	Undertake initial modelling using the Rapid assessment oil spill tool and weathering fate analysis using ADIOS (or refer to the hydrocarbon information in APPENDIX A – Credible spill scenarios and hydrocarbon information)	Intelligence or Environment	**Day 1:** Initial modelling to be available within six hours using the Rapid Assessment Tool		Predictive Modelling of Hydrocarbons to Assess Resources at Risk - OM01 of The Operational Monitoring Operational Plan (Link). *Planning to download immediately and follow steps*
Monitor and evaluate – predictive modelling (OM01)	Yes	Send Oil Spill Trajectory Modelling (OSTM) form (Appendix B – Form 7) to RPS Response team (email [redacted] and call RPS Response Duty Officer Phone [redacted]	Intelligence			
Monitor and evaluate – aerial surveillance (OM02)	Yes	Instruct Aviation Duty Manager to commence aerial observations in daylight hours. Aerial surveillance observer to complete log Appendix B – Form 8)	Logistics - Aviation	**Day 1:** Two trained aerial observers One aircraft available Report made available to the IMT within two		Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk - OM02 of The Operational Monitoring Operational Plan (Link). *Planning to download immediately and follow steps*

Response Techniques	Hydrocarbon type Marine Diesel Oil (MDO)	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Complete ☐	Link to Operational Plans for notification numbers and actions
				hours of landing after each sortie		
Monitor and evaluate – satellite tracking (OM02)	Yes	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 initial acquisition within two hours Data received to be uploaded into Woodside Common Operation Picture daily		
Monitor and evaluate – monitoring hydrocarbons in water (OM03)	Yes	Consider the need to mobilise resources to undertake water quality monitoring (OM03)	Planning or Environment	**Day 3:** Water quality assessment access and capability Daily fluorometry reports to 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 (Link)
Monitor and evaluate – pre-emptive assessment of receptors at risk (OM04)	Yes	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		Pre-emptive Assessment of Sensitive Receptors at Risk (OM04 of The Operational Monitoring Operational Plan)

Response Techniques	Hydrocarbon type Marine Diesel Oil (MDO)	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Complete	Link to Operational Plans for notification numbers and actions
				resource pool in establishing the status of sensitive receptors.		
Monitor and evaluate – shoreline assessment (OM05)	Yes	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 DoT (for Level 2/3 incidents), deployment of 1 specialist(s) in SCAT for each RPA.		Monitoring of contaminated resources (OM05 of The Operational Monitoring Operational Plan)

3. LEVEL 2/3 RESPONSE

3.1 Mobilisation of Response Techniques

For the relevant hydrocarbon type, undertake quick revalidation of the recommended techniques and pre-identified tactics indicated with a 'Yes' in **Table 3-1**. Undertake all validated pre-identified tactics immediately. These tactics should be carried out using the associated plan identified under **Table 3-1** Operational Plan column.

All response techniques and pre-identified tactics have been identified from the pre-operational Net Environmental Benefits Analysis (NEBA) presented in Appendix D of the Eaglehawk-1 Wellhead Decommissioning Environment Plan (Woodside's Oil Spill Preparedness and Response Mitigation Assessment for Eaglehawk-1 Wellhead Decommissioning Environment Plan).

Table 3-1: Level 2/3 Response Summary

Response Techniques	Hydrocarbon Type MDO	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Complete ☐	Link to Operational Plans for notification numbers and actions
Monitor and evaluate – predictive modelling (OM01)	Yes	Undertake initial modelling using the Rapid assessment oil spill tool and weathering fate analysis using ADIOS (or refer to the hydrocarbon information in APPENDIX A – Credible spill scenarios and hydrocarbon information)	Intelligence or Environment	**DAY 1:** Initial modelling to be available within six hours using the Rapid Assessment Tool		Predictive Modelling of Hydrocarbons to Assess Resources at Risk - OM01 of The Operational Monitoring Operational Plan (Link)
	Yes	Send Oil Spill Trajectory Modelling (OSTM) form (Appendix B – Form 7) to RPS Response team (email [redacted]) and call RPS Response Duty Officer Phone [redacted]	Intelligence	**DAY 1:** Detailed modelling within four hours of RPS Response receiving information from Woodside.		
Monitor and evaluate – tracking buoy (OM02)	Yes	Coordinate deployment of satellite tracking buoy immediately from vessel If a surface sheen is visible from the vehicle, deploy the satellite tracking buoy within two hours	OIM/ Operations	**DAY 1:** Tracking buoy deployed within two hours		Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk - OM02 of The Operational Monitoring Operational Plan (Link). Deploy tracking buoy in accordance with APPENDIX D – Tracking Buoy Deployment Instructions - Tracking Buoy Deployment Instructions
Monitor and evaluate – aerial surveillance (OM02)	Yes	Instruct Aviation Duty Manager to commence aerial observations in daylight hours. Aerial surveillance observer to complete log Appendix B – Form 8)	Logistics - Aviation	**DAY 1:** Two trained aerial observers One aircraft available Report made available to the IMT within two hours of landing after each sortie		
Monitor and evaluate – satellite tracking (OM02)	Yes	The Intelligence duty manager should be instructed to stand up KSAT to provide satellite imagery of the spill. [redacted] [redacted]	Intelligence	**DAY 1:** Service provider will confirm initial acquisition within two hours		

Response Techniques	Hydrocarbon Type MDO	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Complete	Link to Operational Plans for notification numbers and actions
				Data received to be uploaded into Woodside Common Operation Picture daily		
Monitor and evaluate – monitoring hydrocarbons in water (OM03)	Yes	Consider the need to mobilise resources to undertake water quality monitoring (OM03)	Planning or Environment	**DAY 3:** Water quality assessment access and capability Daily fluorometry reports to 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 (Link)
Monitor and evaluate – pre-emptive assessment of receptors at risk (OM04)	Yes	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 at Risk (OM04 of The Operational Monitoring Operational Plan)
Monitor and evaluate – shoreline assessment (OM05)	Yes	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 DoT (for Level 2/3 incidents), deployment of 1 specialist(s) in SCAT for each RPA		Monitoring of contaminated resources (OM05 of The Operational Monitoring Operational Plan)
Surface dispersant	No	Potential spill volumes and hydrocarbon properties for MDO spill not suited to surface dispersant	Operations, Logistics and Planning			

Response Techniques	Hydrocarbon Type MDO	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Complete	Link to Operational Plans for notification numbers and actions
Mechanical dispersion	No	This response strategy is not recommended	N/A			
Containment and recovery	No	Potential spill volumes and hydrocarbon properties for MDO spill not suited to containment and recovery	Logistics and Planning			
In-situ burning	No	This strategy is not recommended	N/A			
Shoreline protection and deflection	No	No shoreline contact is predicted	Logistics and Planning			
Shoreline clean up	No	No shoreline contact is predicted	Logistics and Planning			
Oiled wildlife response	Yes	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	**DAY 5:** Contracted capability to treat up to an additional 250 individual fauna within a five-day period Facilities for oiled wildlife rehabilitation are operational 24/7		Oiled Wildlife Response Operational Plan (Link)
Scientific monitoring (Type II)	Yes	Notify Woodside science team of spill event	Environment			Oil Spill Scientific Monitoring Programme – Operational Plan (Link)

4. PRIORITY RECEPTORS

Note: DoT is the Control Agency to respond to all the sites listed below in a Level 2/3 spill into State waters/shorelines.

Based on hydrocarbon spill risk modelling results, no sensitive receptors are predicted to be contacted above the threshold levels outlined in **Table 4-1.**

Table 4-1: Response Thresholds

Surface Hydrocarbon (g/m^2)	Description
>10	Predicted minimum threshold for commencing operational monitoring [2]
50	Predicted minimum floating oil threshold for containment and recovery and surface dispersant application [3]
100	Predicted optimum floating oil threshold for containment and recovery and surface dispersant application
100	Predicted minimum shoreline accumulation threshold for shoreline assessment operations
250	Predicted minimum threshold for commencing shoreline clean-up operations

Figure 4-1 illustrates the location of regional sensitive receptors in relation to the Eaglehawk-1 Exploration Wellhead Operational Area and identifies priority protection areas.

Consideration should be given to other stakeholders (including mariners) in the vicinity of the spill location. **Table 4-2** indicates the assets within the vicinity of the Eaglehawk-1 Exploration Wellhead Operational Area.

Table 4-2: Oil and gas assets in the vicinity (within 50 km) of the Eaglehawk-1 Exploration Wellhead Operational Area.

Asset	Distance and Direction from Eaglehawk-1 Wellhead Decommissioning Operational Area	Operator
Angel Platform	39 km to the east	Woodside
North Rankin Complex	12 km to the southwest	Woodside
Goodwyn A Platform	46 km to the southwest	Woodside
Okha FPSO	21 km to the east	Woodside

[2] 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.

[3] At 50g/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 displaying the spread of surface oil.

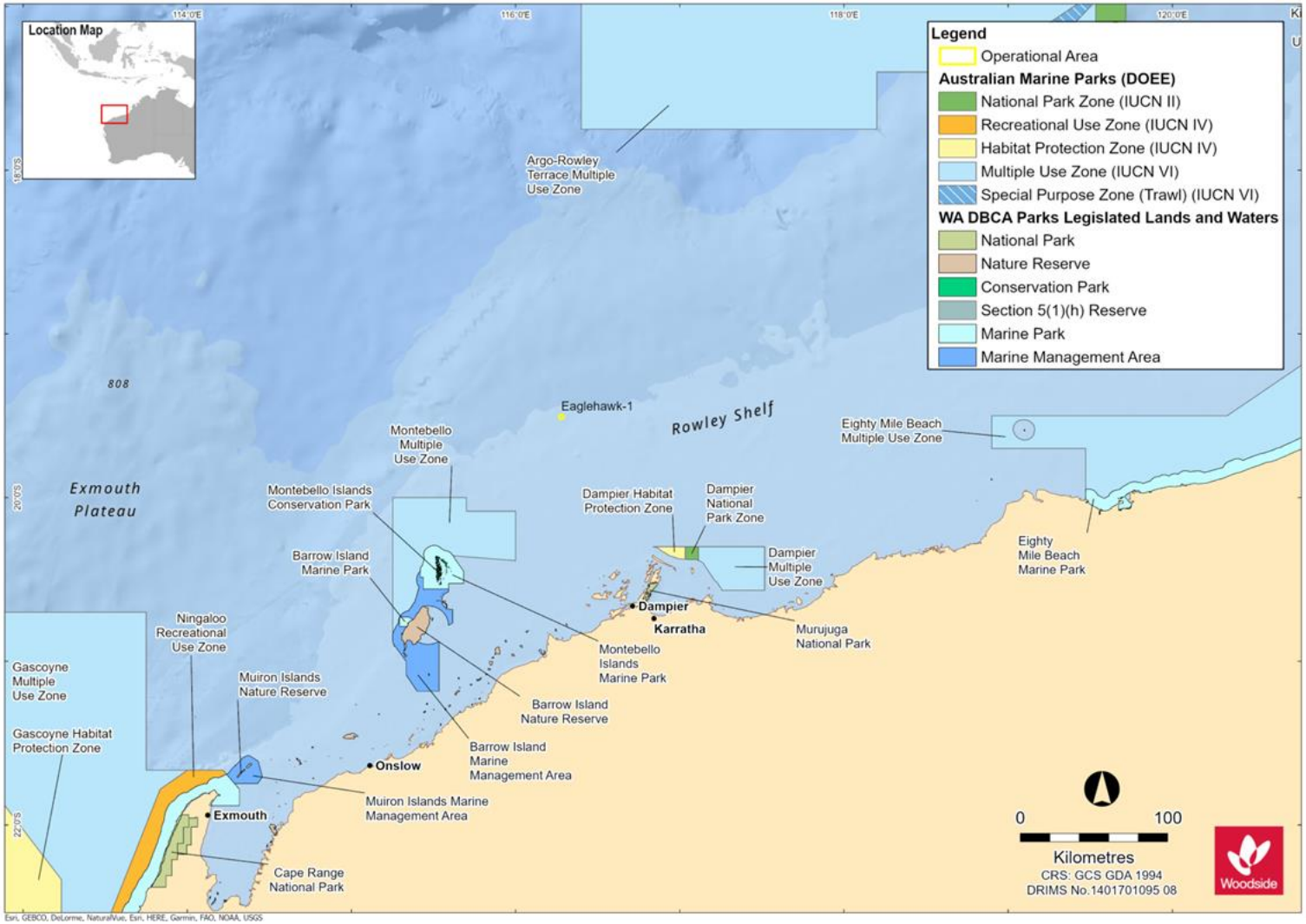


Figure 4-1 Regional Sensitive Receptors – Eaglehawk-1 Exploration Wellhead

5. DISPERSANT APPLICATION

Dispersant is not considered an appropriate response strategy for this activity as described in Appendix D of the Eaglehawk-1 Exploration Wellhead Environment Plan (Link).

APPENDIX A – CREDIBLE SPILL SCENARIOS AND HYDROCARBON INFORMATION

For more detailed hydrocarbon information see the

Hydrocarbon Data Directory (Link)

Credible Spill Scenarios

Scenario	Product	Maximum Volumes	Suggested ADIOS2 Analogue*
Vessel Collision (CS-03 – WCCS)	MDO	Activity vessel – 500 m^3	Diesel Fuel Oil (Southern USA 1) API of 37.2

*Initial screening of possible ADIOS2 analogues was done by considering hydrocarbons with similar APIs. Suggested selection was based on the closest distillation cut to WEL hydrocarbon. Only hydrocarbons with distillation cuts that showed results for > 380°C were included in selection process.

Credible scenarios

One vessel collision scenarios (CS-03) was modelled and is considered the worst-case credible scenario (WCCS) for response planning purposes given that it is an instantaneous, surface release of MDO. The location of CS-03 was selected as a worst case location (i.e. closest point to shore) for the WA-28-P permit area and is located approximately 25 km southeast of the Eaglehawk-1 wellhead and 25 km closer to the WA shoreline than the wellhead location. Modelling of the scenario predicts that the WCCS will not result in shoreline accumulation at response thresholds.

Marine Diesel (Group 1/2 Oil)

MDO is a mixture of volatile and persistent hydrocarbons, with approximately 40-50% by mass predicted to evaporate over the first day or two, depending upon the prevailing conditions, with further evaporation slowing over time (**Figure A-1**). The heavier components of MDO have a strong tendency to entrain into the upper water column due to wind waves, but can re-float to the surface if wind waves abate.

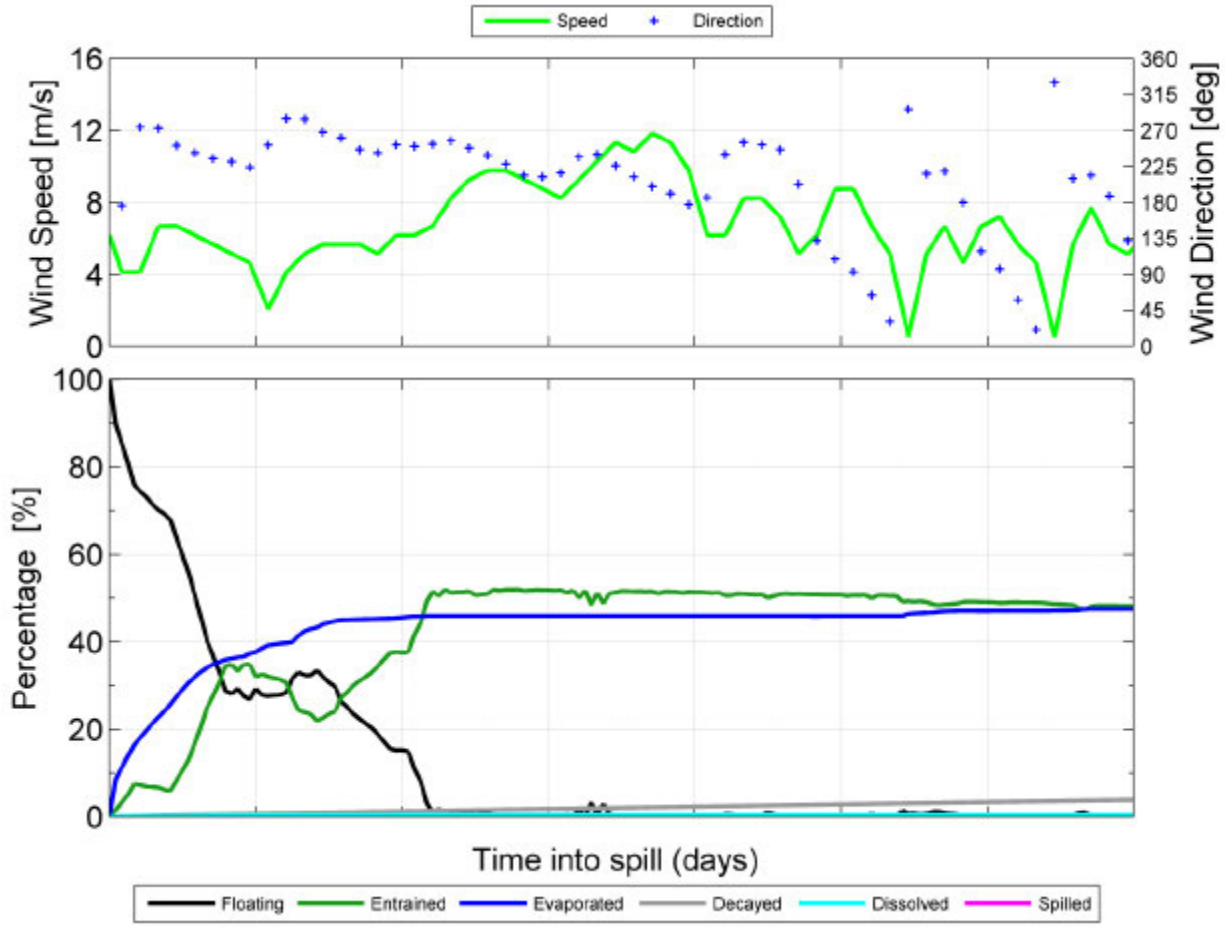


Figure A-1 Mass balance plot representing, as proportion, the weathering of MDO spilled onto the water surface as a one-off release (50 m^3 over 1 hour) and subject to variable wind at 27 °C water temperature and 25 °C air temperature.

Source: Data available from the RSP Response oil database (Diesel Fuel Oil (Southern USA 1997)). NOTE: This information is provided as guidance only. Spill event OSTM should be sought.

APPENDIX B – FORMS

Form No.	Form Name	Link
1	Record of Verbal Notification to Regulator Template	Link
2	NOPSEMA Notification Template	Link
3	Marine Pollution Report (POLREP – AMSA)	Link
4	AMOSC Service Contract Note	Link
5	Marine Pollution Report (POLREP – DoT)	Link
6a	OSRL Initial Notification Form	Link
6b	OSRL Mobilisation Activation Form	Link
7	RPS Response Oil Spill Trajectory Modelling Request	Link
8	Aerial Surveillance Observer Log	Link

FORM 1

Record of initial verbal notification to NOPSEMA

Woodside

(NOPSEMA ph: [redacted]

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. Hydrocarbon source** □ **Platform**_____ □ **Pipeline**_____ □ **FPSO**_____ □ **Exploration drilling**_____ □ **Well**_____ □ **Other (please specify)**_____ **4. Hydrocarbon type**_____ **5. Estimated volume of hydrocarbon** _____ **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:

1. **NOPSEMA** [redacted]
2. **NOPTA** [redacted]
3. **DMIRS** [redacted]

FORM 2

[insert NOPSEMA Notification Template when printing]
Link

FORM 3

[insert Marine Pollution Report (POLREP – AMSA) when printing]
Link

FORM 4

[insert AMOSC Service Contract note when printing]

Link

FORM 5

[insert Marine Pollution Report (POLREP – DoT) when printing]

Link

FORM 6a

[insert OSRL Initial Notification Form when printing]
Link

FORM 6b

[insert OSRL Mobilisation Activation Form when printing]
Link

FORM 7

[insert RSP Response Oil Spill Trajectory Modelling Request form when printing]
Link

FORM 8

[insert Aerial Surveillance Observer Log when printing]

Link

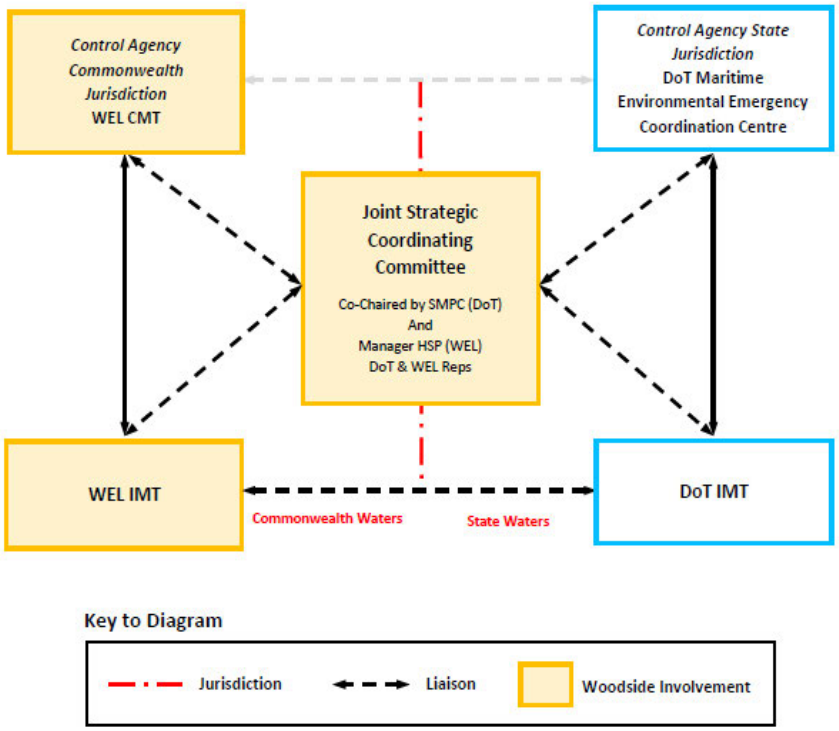
APPENDIX C – 7 QUESTIONS OF SPILL ASSESSMENT

WHAT IS IT? **Oil Type/name** **Oil properties** **Specific gravity / viscosity / pour point / asphaltenes / wax content / boiling point**	
WHERE IS IT? Lat/Long Distance and bearing	
HOW BIG IS IT? Area Volume	
WHERE IT IS GOING? Weather conditions Currents and tides	
WHAT IS IN THE WAY? Resources at risk	
WHEN WILL IT GET THERE? Weather conditions Currents and tides	
WHAT'S HAPPENING TO IT? Weathering processes	

APPENDIX D – TRACKING BUOY DEPLOYMENT INSTRUCTIONS

(Insert Link when printing)

APPENDIX E – COORDINATION STRUCTURE FOR A CONCURRENT HYDROCARBON SPILL IN BOTH COMMONWEALTH AND STATE WATERS/SHORELINES[4]



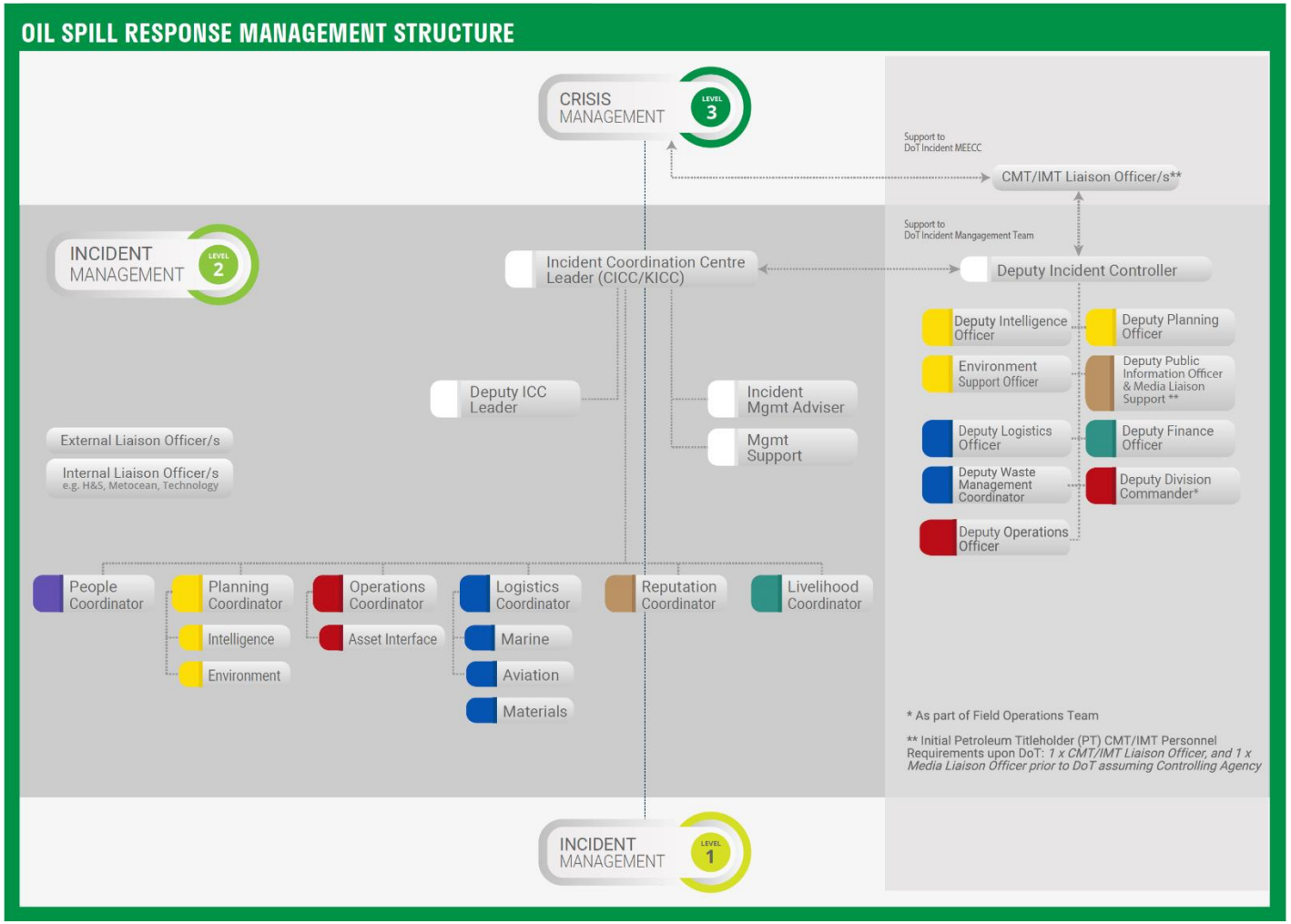
The Control Agency for a Level 1 hydrocarbon spill in Commonwealth waters resulting from an offshore petroleum activity is Woodside (the Petroleum Titleholder).

The Control Agency for a Level 2/3 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.

[4] 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 3.

APPENDIX F – WOODSIDE INCIDENT MANAGEMENT STRUCTURE

Woodside Incident Management Structure for Hydrocarbon Spill (including Woodside Liaison Officers Command Structure within DoT IMT if required).



APPENDIX G – WOODSIDE LIAISON OFFICER RESOURCES TO DOT

Once DoT activates a State waters/shorelines IMT, Woodside will make available the following roles to DoT.

Area	WEL Liaison Role	Personnel Sourced from[5]:	Key Duties	#
DoT MEECC	CMT Liaison Officer	CMT Leader Roster	• Provide a direct liaison between the CMT and the MEECC. • Facilitate effective communications and coordination between the CMT and State Maritime 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	CICC Leader Reserve List 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	AMOSC Staff Member or AMOSC Core Group	• As part of the Intelligence Team, assist the Intelligence Officer in the performance of their duties in relation to situation and awareness. • Facilitate the provision of relevant modelling and predications from the PT IMT. • Assist in the interpretation of modelling and predictions originating from the PT IMT. • Facilitate the provision of relevant situation and awareness information originating from the DoT IMT to the PT IMT. • Facilitate the provision of relevant mapping from the PT IMT. • Assist in the interpretation of mapping originating from the PT IMT. • Facilitate the provision of relevant mapping originating from the DoT IMT to the PT IMT.	1
DoT IMT Intelligence – Environment	Environment Support Officer	Environmental FST Duty Managers 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

[5] See [redacted]

Area	WEL Liaison Role	Personnel Sourced from[5]:	Key Duties	#
DoT IMT Planning-Plans/ Resources	Deputy Planning Officer	AMOSC Core Group/CICC Planning Coordinator Reserve List and Planning Group 3	• 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. **(Note this individual must have intimate knowledge of the relevant PT OPEP and planning process)**	1
DoT IMT Public Information-Media/ Community Engagement	Public Information Support & Media Liaison Officer/ Deputy Public Information Officer	Reputation (Media) FST Duty Manager 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 & Warnings team. • Offer advice to the DoT Media Coordinator on matters pertaining to PT media policies and procedures. • Facilitate effective communications and coordination between the PT and DoT Community Liaison teams. • Assist in the conduct of joint community briefings and events. • Offer advice to the DoT Community Liaison Coordinator on matters pertaining to the PT community liaison policies and procedures. • Facilitate the effective transfer of relevant information obtained from through the Contact Centre to the PT IMT.	1
DoT IMT Logistics	Deputy Logistic Officer	Services FST Logistics Team 2 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

Area	WEL Liaison Role	Personnel Sourced from[5]:	Key Duties	#
DoT IMT Finance-Accounts/ Financial Monitoring	Deputy Finance Officer	CICC Finance 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	CICC 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
DoT IMT Operations - Waste Management	Facilities Support Officer/ Deputy Waste Management Coordinator	Services FST Logistics Team 2 and WEL Waste Contractor 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	AMOSC Core Group	• Provide a direct liaison between the PT FOB and DoT FOB. • Facilitate effective communications and coordination between the PT FOB Operations Commander and the DoT FOB Operations Commander. • Offer advice to the DoT FOB Operations Commander on matters pertaining to PT incident response policies and procedures. • Assist the Senior Safety Officer deployed in the FOB in the performance of their duties, particularly as they relate to PT employees or contractors. • Offer advice to the Senior Safety Officer deployed in the FOB on matters pertaining to PT safety policies and procedures.	1
			Total Woodside Personnel Initial Requirement to DoT IMT	11

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