# WOOLLYBUTT ENVIRONMENT PLAN – FIELD MANAGEMENT AND PLUG AND ABANDONMENT

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# APPENDICES

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# ACRONYMS AND DEFINITIONS USED IN THIS DOCUMENT

| Acronym | Definition |
|---|---|
| ACN | Australian Company Number |
| AFM | Australian FPSO Management |
| AFMA | Australian Fisheries Management Authority |
| AHS | Australian Hydrographic Survey |
| ALARP | as low as reasonably practicable |
| AMOSC | Australian Marine Oil Spill Centre |
| AMOSPlan | Australian Marine Oil Spill Plan |
| 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 |
| BIA | biologically important area |
| BOD | biological oxygen demand |
| BoM | Bureau of Meteorology |
| CAMBA | China-Australia Migratory Bird Agreement |
| CEFAS | Centre for Environment, Fisheries and Aquaculture Science |
| CFA | Commonwealth Fisheries Association |
| CFC | chlorofluorocarbon |
| cm | centimetres |
| CMID | International Marine Contractors Association |
| CP | cathodic protection |
| DAFF | Department of Agriculture, Fisheries and Forestry |
| dB | decibels |
| DEC | Department of Environment and Conservation |
| DEWHA | Department of Environment, Water, Heritage and the Arts |
| DMP | Department of Mines and Petroleum |
| DoAWE | Department of Agriculture, Water and the Environment |
| DoD | Department of Defence |
| DoF | Department of Fisheries |
| DoT | Department of Transport |
| DP | dynamic positioning |
| DPaW | Department of Parks and Wildlife |
| EE | Existing environment |
| EHU | Electro-hydraulic umbilical |
| DSPM | disconnectable single point mooring |

| Acronym | Definition |
|---|---|
| Eni | Eni Australia Limited |
| EP | Environment Plan |
| EPBC | Environment Protection and Biodiversity Conservation |
| et al. | and others |
| FPSO | floating production, storage and offloading vessel |
| FVSN | Four Vanguard Servicos E Navegacao |
| GHG | greenhouse gas |
| GVI | general visual inspection |
| HP | high pressure |
| hr | hour(s) |
| HSE | health, safety and environment |
| HSE IMS | Health, Safety and Environment Integrated Management System |
| HXT | horizontal Xmas tree |
| Hz | Hertz |
| IAPP | International Air Pollution Prevention |
| IMCA | International Marine Contractors Association |
| IMO | International Maritime Organisation |
| IMP | Integrity Management Plan |
| IMS | invasive marine species |
| IMT | Incident Management Team |
| IOTC | Indian Ocean Tuna Commission |
| ISO | International Standards Organisation |
| IUCN | International Union for Conservation of Nature and Natural Resources |
| IV | Intervention vessel |
| JAMBA | Japan-Australia Migratory Bird Agreement |
| JRCC | Joint Rescue Coordination Centre |
| JV | Joint Venture |
| KEF | key ecological feature |
| Kensington | Kensington West Pty Ltd (in liquidation) |
| kg | kilograms |
| km | kilometres |
| L | litres |
| LC | lethal concentration |
| LD | lethal dose |
| m | metres |
| MAH | monocyclic aromatic hydrocarbons |

| Acronym | Definition |
|---|---|
| MARC | Mobil Australia Resources Company Pty Limited |
| MARPOL 73/78 | International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto |
| MDB | mid-depth buoy |
| mg | milligrams |
| mL | millilitres |
| MMbbl | million barrels |
| MMO | marine mammal observer |
| MoC | Management of Change |
| MODU | Mobile offshore drilling unit |
| MoU | Memorandum of Understanding |
| MPRA | Marine Parks and Reserves Authority |
| MSDS | Material Safety Data Sheets |
| NEBA | net environmental benefit analysis |
| NHP | National Heritage Place |
| NM | nautical mile |
| NOPSEMA | National Offshore Petroleum Safety and Environmental Management Authority |
| NOPTA | National Offshore Petroleum Titles Authority |
| NORMs | naturally occurring radioactive materials |
| NOx | oxides of nitrogen |
| NSW | New South Wales |
| NWMR | North-West Marine Region |
| NWS | North West Shelf |
| OCIMF | Oil Companies International Marine Forum |
| OCNS | Offshore Chemical Notification Scheme |
| OIW | oil in water |
| OPEP | Oil Pollution Response Plan |
| OPGGS Act | Offshore Petroleum and Greenhouse Gas Storage Act 2006 |
| OPGGS(E) Regulations | Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 |
| OPMF | Onslow Prawn Managed Fishery |
| OPRC 90 | Oil Pollution Preparedness, Response and Co-operation 1990 |
| OSTM | oil spill trajectory model |
| OVID | Offshore Vessel Inspection Database |
| Pa | pascal |
| PAH | polycyclic aromatic hydrocarbon |
| PFW | produced formation water |

| Acronym | Definition |
|---|---|
| PIC | person in charge |
| PK | peak |
| PMV | production master valve |
| PNEC | predicted no effect concentration |
| POLREP | pollution report |
| ppb | parts per billion |
| ppm | parts per million |
| PSZ | petroleum safety zone |
| PTMF | Pilbara Trap Managed Fishery |
| PWC | perf, wash & cement |
| PWV | production wing valve |
| RCC | Rescue Coordination Centre |
| ROKAMBA | Republic of Korea-Australia Migratory Bird Agreement |
| ROV | remote operated vehicle |
| SB1 | Scalybutt-1 |
| SB1H | Scalybutt-1 side-track |
| SB1M | SB1 manifold |
| Scf | standard cubic feet |
| SCM | subsea control modules |
| SCSSSVs | surface controlled sub surface safety valves |
| SEWPaC | Department of Sustainability, Environment, Water, Population and Communities |
| SITREP | Situation Report |
| SMFG | Size Management Fish Grounds |
| SOLAS | International Convention of the Safety of Life at Sea |
| SOPEP | Shipboard Oil Pollution Emergency Plan |
| SPL | sound pressure level |
| SSSV | sub-surface safety valve |
| SST | sub-sea test |
| SUTU | subsea umbilical termination unit |
| SSWCP | subsea well control package |
| t | tonnes |
| Tap Oil | Tap Oil Limited |
| UNCLOS | United Nations Convention on the Law of the Sea 1982 |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UTA | umbilical termination assembly |
| WA | Western Australia |

| Acronym | Definition |
|---|---|
| WAF | water accommodated fraction |
| WAFIC | Western Australian Fishing Industry Council |
| WB1A | Woollybutt-1A |
| WB2A | Woollybutt-2A-ST1 |
| WB4 | Woollybutt-4 |
| WCE | well control equipment |
| WH | wellhead |
| WHA | World Heritage Area |
| WJV | Woollybutt Joint Venture |
| WOMP | Well Operations Management Plan |
| WTBF | Western Tuna and Billfish Fishery |
| ZPI | zone of potential impact |
| °C | degrees Celsius |
| µ | micro |

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# 1 INTRODUCTION

## 1.1 Overview

Eni Australia Ltd (Eni) as Titleholder under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Cth) (referred to as the Environment Regulations), conducts field management activities on the Woollybutt Field within Permit Area WA-25-L (Figure 1-1). In addition, Eni proposes to undertake the plug and abandonment (P&A) of four to seven wells within Permit Area WA-25-L and recover subsea equipment.

The scope of this Environment Plan (EP) covers the field management activities, well P&A activities and recovery of subsea equipment within Permit Area WA-25-L. Other decommissioning activities will be subject to a separate EP.

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 Background

Eni produced light crude oil from four wells within the Woollybutt field between 2003 and 2012:

- Woollybutt 1 including borehole Woollybutt 1H ST1
- Woollybutt 2A including borehole Woollybutt 2A ST3
- Scalybutt 1 including borehole Scalybutt 1H
- Woollybutt 4 including borehole Woollybutt 4H.

During production, the field development consisted of the above-mentioned four subsea wells that produced through subsea wellheads (WH) and flexible flowlines to a Floating Production, Storage and Offloading (FPSO) facility (Figure 1-2). Production at the field ceased on 16 May 2012 and the FPSO departed from the field on 4 June 2012.

The Woollybutt Joint Venture (WJV) comprises:

- Eni Australia Limited (Eni) (65% equity in WA 25-L, permit operator)
- Mobil Australia Resources Company Pty Limited (MARC) (20% equity in WA 25-L)
- Kensington West Pty Ltd (Kensington) (15% equity in WA 25-L) (in liquidation).

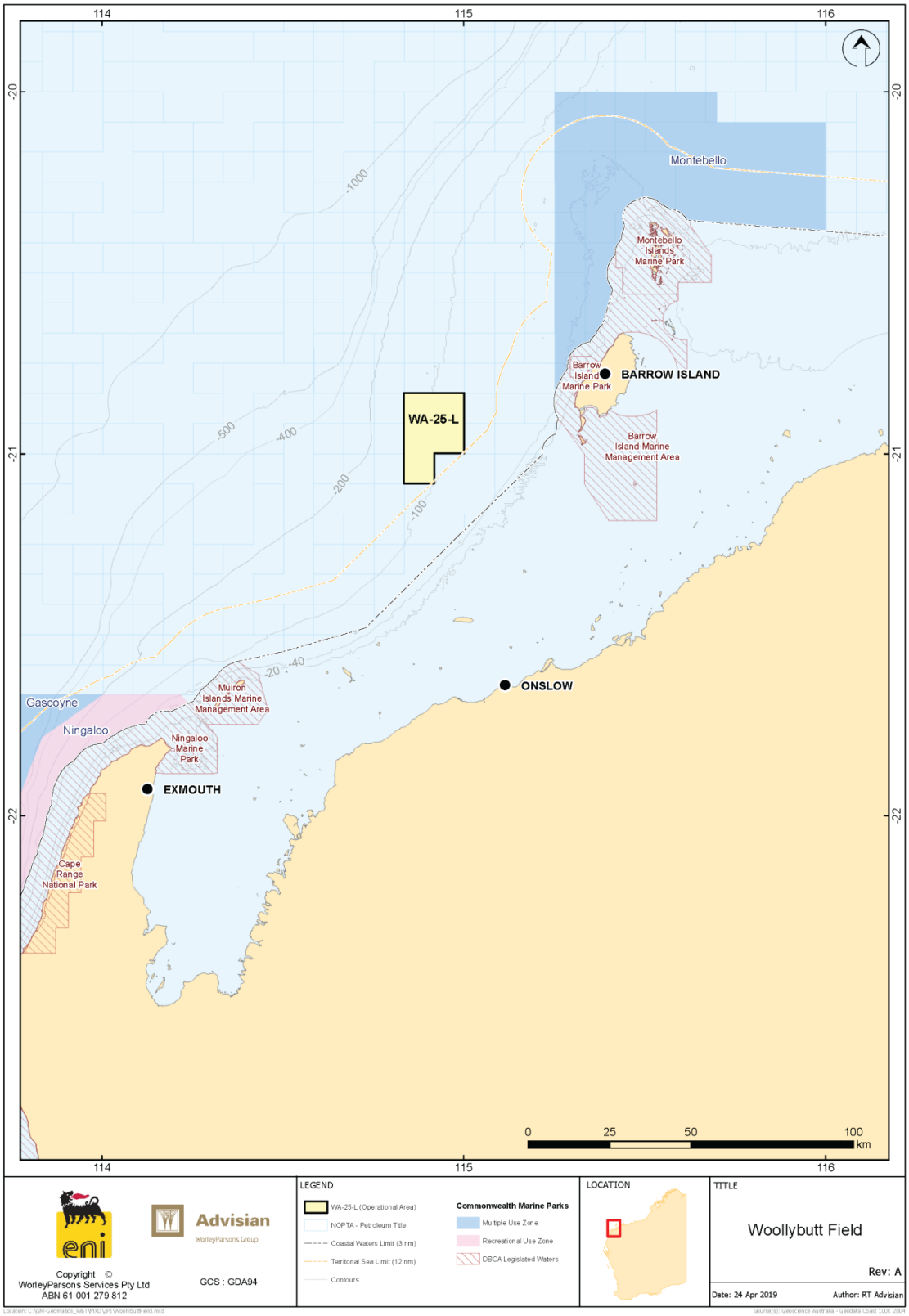



**Figure 1-1: Location of the Woollybutt field in WA-25-L and other Petroleum Titles**

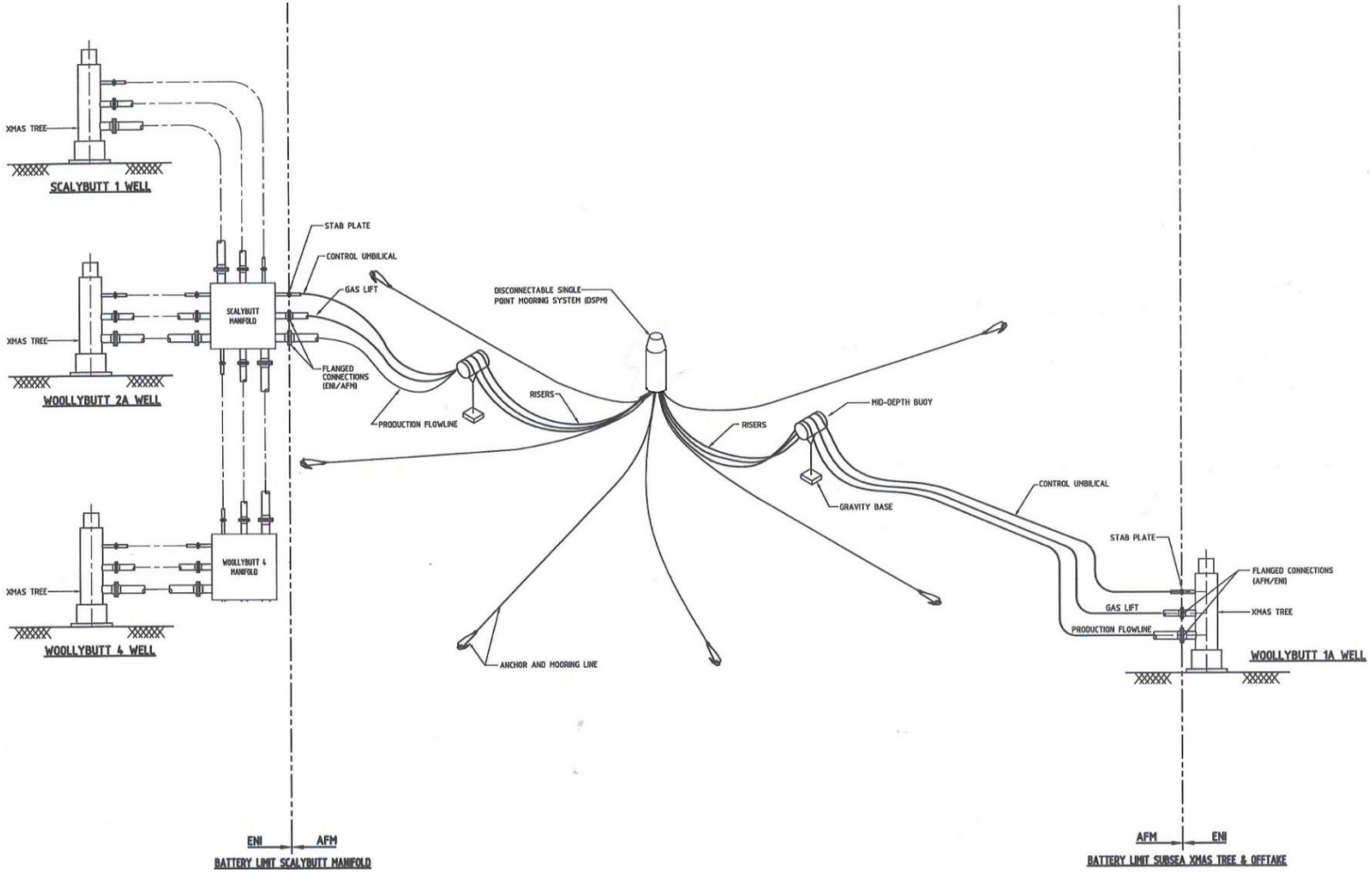



**Figure 1-2: FPSO, disconnectable single point mooring and mooring line configuration**

## 1.3 Purpose and Scope

The purpose of this EP is to identify the potential environmental risks and impacts that may result from the proposed Petroleum Activities Program (which includes field management, plug and abandonment activities, recovery of subsea equipment and wellhead decommissioning, as defined in Section 3). Management measures have been identified to reduce the environmental risks and impacts to an acceptable level. Activity specific performance outcomes, standards and measurement criteria have been developed to reduce impacts and risks to 'as low as reasonably practicable' (ALARP).

The scope of this EP covers field management activities, P&A activities, recovery of Woollybutt subsea equipment and wellheads and Corkybark-1 wellhead abandonment in-situ, as defined in Section 3. All activities are within Permit Area WA-25-L. This EP comes into force when accepted by NOPSEMA, it will then supersede the existing Woollybutt Field Management Environment Plan (Ref 000105_DV_PR.HSE.1011.000 (Rev 14) dated 16/10/2019). This EP is intended to cover a period of 2 years.

Well integrity will continue to be managed in accordance with the in-force Well Operations Management Plan (WOMP).

This EP does not cover the decommissioning of the following Woollybutt infrastructure:

- Mooring anchors and chains
- Umbilical crossing mattresses
- Umbilicals and jumpers
- Flexible flowlines and jumpers.

A separate EP is in development to cover decommissioning of remaining Woollybutt infrastructure listed above (further detailed in Section 3.4.4), to allow sufficient time for ongoing studies to be completed that aim to ensure the final decommissioning strategy presents the best environmental outcome. The field management section of the EP (Section 3.6) has been developed to ensure this infrastructure can be maintained until it is decommissioned, consistent with Eni's obligations under the OPGGS Act, and to allow for assessing a range of decommissioning options and realising the optimal ALARP decommissioning strategy (presented in Section 3.4.4).

All Woollybutt infrastructure will be completely removed in accordance with Section 572(3) of the OPGGS Act, unless NOPSEMA is satisfied that an alternative decommissioning approach presented in the Decommissioning EP delivers equal or better environmental outcomes compared to complete removal.

The Operational Area for this EP is Permit Area WA-25-L within Commonwealth waters, where the Petroleum Activities Program will be undertaken (Section 3.3). This EP only addresses the potential environmental impacts from planned petroleum activities within this Operational Area and any potential unplanned events that originate from within the Operational Area.

Transit to and from the Operational Area by activity support vessels and the Intervention Vessel (IV) required to complete the Petroleum Activities Program, and associated port activities are not within the scope of this EP.

## 1.4 Environment Plan Summary

An EP summary will be prepared based on the material provided in this EP, addressing the items listed in Table 1-1 as required by Regulation 11(4).

**Table 1-1: EP summary**

| EP Summary material requirement | Relevant section of this EP containing EP Summary material |
|---|---|
| The location of the activity | Section 3.2 |
| A description of the receiving environment | Section 4 |
| A description of the activity | Section 3 |
| Details of the environmental impacts and risks | Section 7 and 8 |
| The control measures for the activity | Section 7, 8 and 9 |
| The arrangements for ongoing monitoring of the titleholder's environmental performance | Section 10 |
| Response arrangements in the oil pollution emergency plan | Section 10.14 |
| Consultation already undertaken and plans for ongoing consultation | Section 5 |
| Details of the titleholder's nominated liaison person for the activity | Section 1.5.1 |

## 1.5 Details of Titleholder

The Woollybutt Joint Venture (WJV) is the permit holder of Production Licence WA-25-L. Eni operates the field on behalf of the WJV.

Eni's contact details are:

Eni Australia Limited

226 Adelaide Terrace

Perth WA 6000

Telephone: (08) 9320 1111

Eni Australia Ltd ACN is 009475389

### 1.5.1 Details of the Liaison Person

The nominated contact person for this EP is:

Keith Cook

HSE & CSR Manager

Eni Australia Ltd

Tel: (08) 9320 1111

Email: info@eniaustralia.com.au

### 1.5.2 Notifying of Change

Should the titleholder, titleholder's nominated liaison person or contact details for the titleholder or liaison person change, then NOPSEMA will be notified in writing of the change and provided with the new details.

# 2 ENVIRONMENTAL LEGISLATION

This section describes the key Commonwealth legislation, International agreements and industry guidelines that apply to the Petroleum Activities Program.

## 2.1 Key Commonwealth Legislation

The Petroleum Activities Program will be conducted in Commonwealth waters and are therefore subject to Commonwealth legislation. Key Commonwealth environmental legislation applicable to petroleum operations in Commonwealth waters are detailed below.

### 2.1.1 Offshore Petroleum and Greenhouse Gas Storage Act 2006

The *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) is the principal legislation managing petroleum activities in Australian Commonwealth waters. The subordinate OPGGS (Environment) Regulations 2009 (OPGGS (E) Regulations) relates specifically to environmental management. The objective of the Regulations is to ensure that offshore petroleum operations are performed in a way that is consistent with the principles of ecologically sustainable development.

The OPGGS Act and supporting regulations address licensing, health, safety and environmental matters for offshore petroleum and gas exploration and production operations in Commonwealth waters. Obligations in relation to the maintenance and removal of equipment and property brought onto title are provided in OPGGS Act section 572. Section 572 requires the removal of property when it is no longer used, unless NOPSEMA has accepted alternative arrangements where justification is appropriate and with regard to the Australian Government *Offshore Petroleum Decommissioning Guideline.*

Specifically, the OPGGS (E) Regulations prescribe the requirements for management of environmental impacts associated with petroleum activities, and require proponents to submit an EP to the Regulatory Authority for approval prior to the commencement of activities. As part of these documents, the proponent is required to assess the risks associated with the activities and demonstrate that the proposed mitigation measures reduce these risks to ALARP and acceptable levels.

Table 2-1 includes the pertinent sections of the OPGGS (E) Regulations and details the sections of the EP which ensure compliance with the requirements.

**Table 2-1: Requirements of the OPGGS (E) Regulations**

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| **5G** | **Demonstration of financial assurance prior condition for acceptance of environment plan** | |
| 5G(1) | This regulation applies if:<br>• an environmental plan for a petroleum activity is submitted under Regulation 9, and<br>• there is a titleholder in relation to the activity immediately before the Regulator decides whether or not to accept the plan under Regulation 10, or<br>• a proposed revision of an environmental plan for a petroleum activity is submitted under Regulation 17, 18 or 19. | Section 11 – Financial Assurance |
| **11A** | **Consultation with relevant authorities, persons and organisations, etc.** | |
| 11A(1) | In the course of preparing an environment plan, or a revision of an environment plan, a titleholder must consult each of the following (a relevant person):<br>• each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant<br>• each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant<br>• the Department of the responsible State Minister, or the responsible Northern Territory Minister<br>• 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 environment plan<br>• any other person or organisation that the titleholder considers relevant. | Section 5– Stakeholder Consultation and Appendix D |
| 11A(2) | For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. | Section 5 – Stakeholder Consultation and Appendix D |
| 11A(3) | The titleholder must allow a relevant person a reasonable period for the consultation. | Section 5 – Stakeholder Consultation and Appendix D |

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| **13** | **Environmental assessment** | |
| 13(1) | *Description of the activity* | |
| | The environment plan must contain a comprehensive description of the activity including the following:<br>• the location or locations of the activity<br>• general details of the construction and layout of any facility<br>• an outline of the operational details of the activity (for example, seismic surveys, exploration drilling or production) and proposed timetables<br>• any additional information relevant to consideration of environmental impacts and risks of the activity. | Section 3 – Description of Activity |
| 13(2) | *Description of the environment* | |
| | The environment plan must:<br>• describe the existing environment that may be affected by the activity<br>• include details of the particular relevant values and sensitivities (if any) of that environment. | Section 3 – Description of the Environment |
| | *Requirements* | |
| 13(4) | The environment plan must:<br>• describe the requirements, including legislative requirements, that apply to the activity and are relevant to the environmental management of the activity, and<br>• demonstrate how those requirements will be met. | Section 1 – Legislation |
| 13(5) | *Evaluation of environmental impacts and risks* | |
| | The environment plan must include:<br>• details of the environmental impacts and risks for the activity<br>• an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk, and<br>• details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level. | Sections 7 and 8 – Environmental Risk Assessments |

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| 13(6) | To avoid doubt, the evaluation mentioned in paragraph 13(5)(b) must evaluate all the significant impacts and risks arising directly or indirectly from: | |
| | • all operations of the activity, and | Sections 7 and 8 – Risks from all operations of the activity |
| | • potential emergency conditions, whether resulting from accident or any other reason. | Section 8.10 – Risks from emergency conditions |
| 13(7) | *Environmental performance outcomes and standards* | |
| | The environment plan must:<br>• set environmental performance standards for the control measures identified under paragraph (5)(c)<br>• set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured, and<br>• include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met. | Section 9 – Performance outcomes, standards and measurement criteria |
| **14** | **Implementation strategy for the environment plan** | |
| 14(1) | The environment plan must contain an implementation strategy for the activity in accordance with this regulation. | Section 10.8 – Reporting |
| 14(2) | The implementation strategy must:<br>• state when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity, and<br>• provide that the interval between reports will not be more than 1 year. | |

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| 14(3) | The implementation strategy must contain a description of the environmental management system for the activity, including specific measures to be used to ensure that, for the duration of the activity:<br>• the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as low as reasonably practicable,<br>• control measures detailed in the environment plan are effective in reducing the environmental impacts and risks of the activity to as low as reasonably practicable and an acceptable level, and<br>• environmental performance outcomes and standards set out in the environment plan are being met. | Section 10 – Implementation Strategy |
| 14(4) | The implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of personnel in relation to the implementation, management and review of the environment plan, including during emergencies or potential emergencies. | Section 10.2 – Roles and Responsibilities |
| 14(5) | The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training. | Section 10.2 – Roles and Responsibilities |
| 14(6) | The implementation strategy must provide for sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the environment plan are being met. | Section 10.8 – Reporting<br>Section 10 – Inspection and Review<br>Section 10.7 – Non-Conformance |
| 14(7) | The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met. | Section 10.5 – Monitoring<br>Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |
| 14(8) | The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan. | Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| 14(8AA) | The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following:<br>• the control measures necessary for timely response to an emergency that results or may result in oil pollution<br>• the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability<br>• the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met, and<br>• the arrangements and capability in place for monitoring oil pollution to inform response activities. | Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |
| 14(8A) | The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity. | Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |
| 14(8B) | The arrangements for testing the response arrangements must include:<br>• statement of the objectives of testing<br>• a proposed schedule of tests<br>• mechanisms to examine the effectiveness of response arrangements against the objectives of testing, and<br>• mechanisms to address recommendations arising from tests. | Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| 14(8C) | The proposed schedule of tests must provide for the following:<br>• testing the response arrangements when they are introduced<br>• testing the response arrangements when they are significantly amended<br>• testing the response arrangements not later than 12 months after the most recent test<br>• if a new location for the activity is added to the environment plan after the response arrangements have been tested, and before the next test is conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan, and<br>• if a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational. | Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |
| 14(8D) | The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that:<br>• is appropriate to the nature and scale of the risk of environmental impacts for the activity, and<br>• is sufficient to inform any remediation activities. | Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |
| 14(8E) | The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response. | Section 10 – Oil Pollution Emergency Plan<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |
| 14(9) | The implementation strategy must provide for appropriate consultation with:<br>• relevant authorities of the Commonwealth, a State or Territory, and<br>• other relevant interested persons or organisations. | Section 5 – Stakeholder Consultation |

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| **15** | **Details of titleholder and liaison person** | |
| 15(1) | The environment plan must include the following details for the titleholder:<br>• name<br>• business address<br>• telephone number (if any)<br>• fax number (if any)<br>• email address (if any), and<br>• if the titleholder is a body corporate that has an ACN (within the meaning of the *Corporations Act 2001*)—ACN. | Section 1 – Details of Titleholder |
| 15(2) | The environment plan must also include the following details for the titleholder's nominated liaison person:<br>• name<br>• business address<br>• telephone number (if any)<br>• fax number (if any), and<br>• email address (if any). | Section 1.5.1 – Details of Liaison Person |
| 15(3) | The environment plan must include arrangements for notifying the Regulator of a change in the titleholder, a change in the titleholder's nominated liaison person or a change in the contact details for either the titleholder or the liaison person. | Section 10.8 – Annual Report |

| Reg. | Requirement | Relevant section in the EP |
|---|---|---|
| **16** | **Other information in the environment plan** | |
| 16 | The environment plan must contain the following:<br>• a statement of the titleholder's corporate environmental policy;<br>• a report on all consultations between the titleholder and any relevant person, for regulation 11A, that contains:<br>○ a summary of each response made by a relevant person<br>○ an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates<br>○ a statement of the titleholder's response, or proposed response, if any, to each objection or claim, and<br>○ a copy of the full text of any response by a relevant person.<br>• details of all reportable incidents in relation to the proposed activity. | Appendix A –HSE Statement<br>Appendix D – Stakeholder Consultation Transcripts |

### 2.1.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary Commonwealth environmental assessment legislation aimed at protecting and managing flora, fauna, ecological communities, environmentally sensitive and heritage places defined as matters of national environmental significance.

On 28 February 2014, NOPSEMA became the sole designated assessor of petroleum and greenhouse gas activities in Commonwealth waters in accordance with the Minister for the Environment's endorsement of NOPSEMA's environmental authorisation process under Part 10, section 146 of the EPBC Act. All actions which are petroleum and greenhouse gas activities undertaken in Commonwealth waters in accordance with the OPGGS(E) Regulations (noting exceptions for activities with extreme sensitivity, such as those in the Great Barrier Reef or Antarctica) have been approved as "approved classes of actions" and do not require referral, assessment and approval under the Environment Protection and Biodiversity Conservation Act 1999. Environmental aspects of Petroleum Activities Program are therefore regulated by NOPSEMA.

Prior to the abovementioned change in 2014, the Woollybutt Project environmental approval was provided under the EPBC Act (EPBC 2001/365) in 2001, and this approval continues to have effect. Table 2-2 presents the conditions of the EPBC approval and details how they have been met within this EP.

The Australian Government Minister for the Environment may make or adopt and implement recovery and management plans for threatened fauna, threatened flora (other than conservation dependent species) and threatened ecological communities listed under the EPBC Act. Recovery and management plans relevant to this EP are outlined in Section 4.5.

**Table 2-2: Conditions from EPBC 2001/365 approval relevant to the petroleum activities program**

| Condition Number | Condition | Applicable Section of this EP detailing how condition has been met |
|---|---|---|
| 1 | The person taking the action must implement cetacean interaction procedures for supply vessels consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000. | See Section 8.3 |
| 2 | The person taking the action must provide the results of pluming studies and analyses of biomarkers on the impacts of discharged produced formation water to the Minister prior to decommissioning. | Outside the scope of this EP. |
| 3 | Before the Woollybutt Oil Field Production Facility is commissioned, the person taking the action must prepare and submit for the Minister's approval an Oil Spill Contingency Plan detailing the strategy to mitigate potential oil spills. Within two months of production operations commencing, the person taking the action must submit a revised plan for approval, which must incorporate the results of tests on the Woollybutt crude oil for toxicity, weathering and effectiveness of dispersants. The most recently approved plan must be implemented. | Geotechnical Services Ltd, 2002. Laboratory Scale Weathering and Dispersibility of Oil Report. (ENV 02-228) (Appendix E) contains details on the weathering and effectiveness of dispersant on Woollybutt crude.<br>Woollybutt OPEP (000105_DV_PR.HSE.1045.000). |
| 4 | The person taking the action must not commence decommissioning unless an environment plan that includes measures related to decommissioning is in force under the OPGGS Environment Regulations. The person taking the action must comply with that environment plan. | Subsea equipment removal is included in Section 3.8.<br>Further decommissioning is outside the scope of this EP.<br>A separate decommissioning EP will be prepared and submitted for approval before commencing decommissioning. |

| Condition Number | Condition | Applicable Section of this EP detailing how condition has been met |
|---|---|---|
| 5 | A plan required by condition 3 is automatically deemed to have been submitted to, and approved by, the Minister if the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) relating to the taking of the action that:<br>a) was submitted to NOPSEMA after 27 February 2014; and<br>b) either:<br>i) is in force under the OPGGS Environment Regulations; or<br>ii) has ended in accordance with regulation 25A of the OPGGS Environment Regulations. | This EP. |
| 5A | Where a plan required by condition 3 has been approved by the Minister and the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) that:<br>a) was submitted to NOPSEMA after 27 February 2014; and<br>b) either:<br>i) is in force under the OPGGS Environment Regulations; or<br>ii) has ended in accordance with regulation 25A of the OPGGS Environment Regulations, the plan approved by the Minister no longer needs to be implemented. | This EP. |
| 5B | Where an environment plan, which includes measures specified in the conditions referred to in conditions 5 and 5A above, is in force under the OPGGS Environment Regulations that relates to the taking of the action, the person taking the action must comply with those measures as specified in that environment plan. | This EP.<br>Environmental Outcomes, Standards and Measurement Criteria are contained in Section 9. |

### 2.1.3 Underwater Cultural Heritage Act 2018

The *Underwater Cultural Heritage Act 2018* gives clarity to the present and ongoing jurisdictional arrangements for protecting and managing Australia's underwater cultural heritage in line with the 2010 Australian Underwater Cultural Heritage Intergovernmental Agreement. It is an offence to interfere with any shipwreck covered by the Act.

There are no known shipwrecks located within the Operational Area. Shipwrecks occur outside the Operational Area (SEWPaC, 2012a; 2012b) and are further described in Section 0.

### 2.1.4 National Greenhouse and Energy Reporting Act 2007

This Act provides for the reporting and dissemination of information related to greenhouse gas emissions, greenhouse gas projects, energy production and energy consumption.

### 2.1.5 Navigation Act 2012

The Act replaces the century old *Navigation Act 1912* with a contemporary legislative framework for maritime regulation. The Act reflects changes in the maritime sector and is the primary legislative means for the Australian Government to regulate international ship and seafarer safety, shipping aspects of protecting the marine environment and the actions of seafarers in Australian waters. It also gives effect to the relevant international conventions to which Australia is a signatory, including MARPOL 73/78 (see Section 2.3, Table 2-5).

### 2.1.6 Protection of the Sea (Prevention of Pollution from Ships) Act 1983

This Act gives effect to the *International Convention for the Prevention of Pollution from Ships* (MARPOL 73/78) (see Section 2.3, Table 2-5) and regulates discharges from ships to protect the sea from pollution and establishes requirements for a shipboard waste management plan.

### 2.1.7 Biosecurity Act 2015

The *Biosecurity Act 2015* sets mandatory controls for the use of seawater as ballast in ships and the declaration of sea vessels that enter and depart Commonwealth waters. The associated Regulations stipulate the management requirements of ballast water and that all information regarding the voyage of the vessel and the ballast water is to be declared correctly to the Director of Biosecurity.

### 2.1.8 Environment Protection (Sea Dumping) Act 1981

Australia regulates the loading and dumping of waste at sea under the Environment Protection (Sea Dumping) Act 1981 (the Sea Dumping Act). This Act also fulfils Australia's international obligations under the London Protocol to prevent marine pollution by controlling dumping of wastes and other matter. Under the Sea Dumping Act, the Commonwealth aims to minimise pollution threats by:

- Prohibiting ocean disposal of waste considered too harmful to be released in the marine environment.
- Regulating permitted waste disposal to ensure environmental impacts are minimised.

Permits are required from DoAWE for all ocean disposal activities. Permits include those for dredging operations, the creation of artificial reefs, dumping of vessels and platforms or other man-made structures and burial at sea.

Prior to undertaking such activities, Eni will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act.

### 2.1.9 Key Commonwealth Legislation Summary

Table 2-3 summarises the key Commonwealth legislation that is relevant to the environmental aspects of the Activity.

**Table 2-3: Summary of key Commonwealth legislation**

| Legislation | Requirements |
|---|---|
| OPGGS Act 2006 | Licensing requirements.<br>Section 280 interference with other marine rights.<br>Section 569 operations to be carried out in accordance with good oilfield practice.<br>Section 574 written directions can be given to titleholders. |
| EPBC Act 1999 | Relates to significant impacts on matters of national environmental significance.<br>Conditional EPBC decision in place (EPBC 2001/365). |
| *Underwater Cultural Heritage Act 2018* | Relates to the protection of shipwrecks of heritage value.<br>There are no historical shipwrecks within or in the vicinity of the field (see Section 0). |
| *National Greenhouse and Energy Reporting Act 2007* | Greenhouse gas reporting requirements. |
| *Navigation Act 2012* | Requirements for ships transporting oil and chemicals. |
| *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* | Discharge requirements from ships. |
| *Protection of the Sea (Harmful Anti-fouling systems) Act 2006* | Requirements for the use of anti-fouling substances and prohibits the use of certain types of materials for anti-fouling. Vessels used during the activity will have anti fouling coatings in place and as such are subject to the Act. |
| *Protection of the Sea (Powers of Intervention) Act 1981* | This Act provides a range of powers to Australian Maritime Safety Authority (AMSA) that allow it to take measures and issue directions to prevent or respond to pollution of the sea by oil or other substances. As hydrocarbons spills are identified as credible hazards in relation to the activities in this EP, this Act is applicable. |
| *Protection of the Sea (Civil Liability for Bunker Oil Pollution Damage) Act 2008* | Insurance requirements for ships in Australian waters. Activities in this EP will be carried out using commercial vessels powered with hydrocarbon fuel and as such is subject to the Act. |

| Legislation | Requirements |
|---|---|
| *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* | Enables the Australia Government to respond to requests to protect traditionally important areas and objects that are under threat, if it appears that state or territory laws have not provided effective protection.<br>There are no sites of Aboriginal heritage in the vicinity of the operational area (see Section 0). |
| *Australian Heritage Council Act 2003* | Relates to protection of heritage: an Act to establish the Australian Heritage Council, and for related purposes |
| *Australian Maritime Safety Authority Act 1990* | Relates to the protection of the marine environment and maritime and aviation search and rescue services: an Act to establish AMSA. |
| *Hazardous Waste (Regulation of Exports and Imports) Act 1989* | Relating to general vessel operations: this Act relates to controls over import and export of hazardous waste material. Permits are required to dispose of waste overseas or to import waste into Australia. |
| *Native Title Act 1993* | Recognising by Australian law that some Indigenous people have rights and interests to their land that come from their traditional laws and customs.<br>There are no Native Title claims in the vicinity of the operational area (see Section 0). |
| *Biosecurity Act 2015* | The Biosecurity Act 2015 came into effect on 16 June 2016 and replaced the *Quarantine Act 1908*. Provisions within the Act relating to the management of ballast water and biofouling are of relevance to the petroleum activities. |
| *Environment Protection (Sea Dumping) Act 1981 (the Sea Dumping Act).* | The Environment Protection (Sea Dumping) Act 1981 requires sea dumping permits to be required for particular activities and gives effect to the United Nations Convention on the Law of the Sea (UNCLOS) and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and associated Protocol |

## 2.2 State Legislation

The Operational Area for this EP is Permit Area WA-25-L within Commonwealth waters where P&A, field management and recovery of subsea equipment activities will be undertaken. Vessels supporting these activities are expected to pass through Western Australia (WA) State waters whilst transiting to and from a port.

Whilst in WA State waters the support vessels will have to comply with a variety of WA legislation, including those listed in Table 2-4.

**Table 2-4: Applicable State legislation**

| Legislation | Summary |
|---|---|
| *Dangerous Goods Safety Act 2004* | Relating to general vessel operations: this Act provides for the safe storage, handling and transport of certain dangerous goods, including explosives, gases and flammable or combustible liquids. Licensing may be required, depending on the substances involved and the quantities stored or transported. These laws are administered by the Department of Mines, Industry Regulation and Safety. |
| *Environmental Protection Act 1986* | Relating to non-routine operations (potential oil spills) in areas under State jurisdiction: this Act provides for the prevention, control and abatement of pollution and environmental harm and for the conservation, preservation, protection, enhancement and management of the environment. |
| *Pollution of Waters by Oil and Noxious Substances Act 1987* | Relating to non-routine operations (potential oil spills) in State waters: this Act relates to the protection of the sea and certain waters from pollution by oil and other noxious substances discharged from ships and places on land. |
| *Western Australia Marine Act 1982* | Relating to vessel movements: an Act to regulate navigation and shipping. |
| *Western Australian Marine (Sea Dumping) Act 1981* | Relating to general vessel operations: an Act to provide for the protection of the environment by regulating the dumping into the sea, and the incineration at sea, of wastes and other matter and the dumping into the sea of certain other objects, and for other purposes. |
| *Biodiversity Conservation Act 2016* | The *Biodiversity Conservation Act 2016* came into effect on 3 December 2016 and replaced the *Wildlife Conservation Act 1950*. Relating to potential impacts to listed species: this Act provides for the conservation and protection of Western Australian wildlife. |
| *Fish Resources Management Regulations 1995* | Under regulation 176 of the Fish Resources Management Regulations 1995 (FRMR), it is an offence to translocate live non-endemic fish to WA without permission. Under section 105 of the *Fish Resources Management Act 1994* (FRMA), it is an offence to bring noxious fish into WA.<br>Also, under Part 16A of the FRMA, the Department has emergency powers to deal with incursions of Invasive Marine Species (IMS), which include directing a person to carry out necessary activities to prevent or control the spread of IMS, or to eradicate them in WA waters. If these activities are not undertaken, we may carry out the activities and recover any costs incurred from the person initially directed to do so. |

## 2.3 International Agreements

International agreements and conventions that apply to Petroleum Activities Program are summarised in Table 2-5.

**Table 2-5: Applicable international agreements and conventions**

| International Agreements and Conventions | Summary |
|---|---|
| Bilateral migratory bird agreements between the Government of Australia and the Government of Japan (JAMBA), China (CAMBA), and Republic of Korea (ROKAMBA) | These agreements recognise international concern for the protection of migratory birds and birds in danger of extinction. |
| Convention for the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989 (Basel Convention) | This convention deals with the transboundary movement of hazardous wastes, particularly by sea. |
| Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78) | This convention aims to preserve the marine environment by eliminating completely pollution by oil and other harmful substances and by minimising accidental discharge of such substances.<br>It contains five Annexes, dealing respectively with oil, noxious liquid substances, harmful packaged substances, sewage and garbage. Detailed rules are laid out as to the extent to which (if at all) such substances can be released in different sea areas. |
| Convention on Biological Diversity 1992 | The objectives of the convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. |
| Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC 90) | This convention establishes national arrangements for responding to oil pollution incidents from ships, offshore oil facilities, sea ports and oil handling.<br>The convention recognises that in the event of a pollution incident, prompt and effective action is essential. |
| Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention) | This convention aims to improve the status of all threatened migratory species by national action and international agreements between range states. |
| Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (known as the London Protocol) | The London Convention contributes to the international control and prevention of marine pollution by prohibiting the dumping of certain hazardous materials. |
| International Convention for the Protection of Pollution from Ships (1973) and Protocol (1978) (MARPOL 73/78) | This convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. |
| International Convention on Civil Liability for Oil Pollution Damage 1969 | The Civil Liability Convention ensures that adequate compensation is available to persons who suffer oil pollution damage resulting from maritime casualties involving oil-carrying ships by placing liability for such damage on the owner of the ship. |
| International Convention on OPRC 90 | This convention provides a framework to facilitate international cooperation in preparing for and responding to major oil pollution incidents. Australia acceded to this Convention in 1992. |

| International Agreements and Conventions | Summary |
|---|---|
| International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969 | The Convention gives State Parties powers to intervene on ships on the high seas when their coastlines are threatened by an oil spill from that ship. |
| International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) 2004 | The Convention aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. |
| United Nations Convention on the Law of the Sea 1982 (UNCLOS) | This convention recognises the desirability of establishing a legal order for the seas and oceans which will facilitate international communication, and will promote:<br>• the peaceful uses of the seas and oceans<br>• the equitable and efficient utilisation of their resources<br>• the conservation of their living resources<br>• the study, protection and preservation of the marine environment. |
| United Nations Framework Convention on Climate Change (UNFCCC) 1992 | The UNFCCC is an international environmental treaty with the objective of stabilising greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system. |
| Vienna Convention for the Protection of the Ozone Layer 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer 1987 | The Vienna Convention is a multilateral environmental agreement that acts as framework for international efforts to protect the ozone layer. The accompanying Montreal Protocol specifies the reduction goals for the uses of chlorofluorocarbons (CFCs), the main chemical agents causing ozone depletion. |
| Climate Change Convention (1992) | Relating to general vessel operations: the objective of the convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system. Australia ratified the convention in December 1992 and it came into force on 21 December 1993. |

## 2.4 Industry Guidelines

The Australian petroleum exploration and production industry operates under various industry codes of practice, such as the Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (2008). These provide guidelines for activities that are not subject to prescriptive regulation and have evolved from the collective knowledge and experience of the oil and gas industry, nationally and internationally. Eni is a member of APPEA and when undertaking its projects and activities, adheres to the provisions of its Code of Environmental Practice. The APPEA Code of Environmental Practice was a key reference in preparing for the environmental risk assessment and development of performance outcomes in this EP. A summary of applicable industry guidelines is provided in Table 2-6.

**Table 2-6: Applicable industry guidelines**

| Guidelines and Agreements/ Conventions | Summary |
|---|---|
| APPEA Code of Environmental Practice | October 2008 – Management system and a comprehensive list of environmental guidelines for the petroleum industry. Provides guidelines for activities that are not formally regulated and have evolved from the collective knowledge and experience of the oil and gas industry. |
| Environmental Plan Content Requirements (N04750-GN1344) | Revision 3, April 2016, NOPSEMA – This guidance note aims to provide guidelines for use by titleholders in preparing environment plans for submission to NOPSEMA. |
| Australian Ballast Water Management Requirements (Version 7) – Department of Agriculture, Fisheries and Forestry (DAFF) | July 2017 – This document provides requirements for management measures to reduce the risk of introducing harmful aquatic organisms into Australia's marine environment through ship's ballast water. |
| National Biofouling Management Guidance for the Petroleum Production and Exploration Industry | April 2009 – This document provides recommendations for the management of biofouling hazards by vessels and equipment used in the petroleum industry. |
| Offshore Petroleum Decommissioning Guideline – Department of Industry, Innovation and Science | January 2018 – Decommissioning guideline confirming the Australian Government's policy expectation that removal of property is the "base case" or default decommissioning requirement.<br>Assists offshore petroleum titleholders to plan and seek the regulatory approvals necessary to undertake a decommissioning project, and to understand the expectations of relevant decision-makers. |
| WA DPIRD Biofouling and Biosecurity Policy | The Department's focus is on prevention of the transport, introduction and establishment of aquatic pests and diseases within the State through the proactive management of (i.e. minimisation of) biofouling on vessels, other moveable structures and immersible equipment prior to travel into and within the State.<br>The Department of Fisheries' policy is that vessels should be 'clean' before leaving for new destinations within WA. This means the risk of aquatic pest and disease transport should be kept to an acceptable (low) level by vessel managers complying with relevant international, national and State obligations, legislation and guidelines prior to travel into and within WA waters. |

# 3 DESCRIPTION OF THE ACTIVITY

## 3.1 Overview

This section has been prepared in accordance with Regulation 13(1) of the OPGGS (E) Regulations and describes petroleum activities to be undertaken in accordance with this EP.

The activity involves field management, well P&A, recovery of subsea equipment and wellhead decommissioning. It is planned that all four shut-in production wells in the Woollybutt field will be P&A. An additional three suspended wells may require some P&A scope, pending well integrity close-out against the WOMP (000105_DV_PR.D&C.1028.000).

Field management (Section 3.6) comprises:

- cathodic protection (CP) and general visual inspection (GVI) surveys of shut-in production wells and subsea field infrastructure in accordance with the Eni Woollybutt Integrity Management Plan (IMP) (20-061-PL-001) using a remotely operated vehicle (ROV) deployed from a vessel.
- inspection, monitoring, maintenance and repair of subsea field infrastructure in accordance with the Eni Woollybutt Integrity Management Plan (IMP) (20-061-PL-001)

P&A (Section 3.7) comprises:

- performing a Subsea Xmas Tree (XT) pre-execution campaign using an ROV deployed from a vessel to perform preparatory scope which may include inspection, cleaning and testing of critical interfaces and substitution of the over-trawlable debris tree cap structure with a lightweight temporary tree cap in readiness for re-entry of the wells
- mobilising either an Intervention vessel (IV) or Mobile Offshore Drilling Unit (MODU) to the field with integrated services to perform the well activity scope with logistical support provided by up to three support vessels and helicopter services
- entering suspended wells and performing scope pursuant to agreed criteria in the WOMP (000105_DV_PR.D&C.1028.000), to effectively seal off all distinct permeable zones and prevent the flow of formation fluids to the external marine environment

Subsea equipment recovery (Section 3.8) comprises:

- surveying all seabed equipment in the Woollybutt field using ROV and high pressure water jetting to expose and clean lift points and cutting sites
- disconnecting flowlines, umbilicals, chains and other structures using a subsea hydraulic shear cutter, super grinder or multi cutter
- retrieving equipment (listed in Section 3.8) from the seabed using a combination of engineered recovery beam or rigging or subsea pipe baskets or grabs from a IV / MODU.

Wellhead decommissioning comprises:

- permanently leaving in-situ the Corkybark-1 wellhead (Section 3.5.1.4).

Decommissioning of the remaining Woollybutt field subsea infrastructure (listed in Section 3.4.4) will be the subject of a separate EP. Until decommissioning, field management will be ongoing to maintain remaining infrastructure in accordance with section 572 of the OPGGS Act.

## 3.2 Location and History

The Woollybutt field is located in Permit Area WA-25-L, approximately 65 km north of Onslow and 35 km west of Barrow Island. The field was discovered in 1997 and lies on the continental shelf in 100 m water depth. It and produced crude (49°API) with a low gas-to-oil ratio of 135 scf/MMbbl.

The Woollybutt field was developed in three stages:

1. The original field development began as a two well tie back to the Woollybutt floating production storage and offloading (FPSO), Four Vanguard in 2003. These two wells were Woollybutt-1A (WB1A) and Woollybutt-2A-ST1 (WB2A ST1).
2. The Scalybutt-1 (SB1) well was added in 2005 and a new Scalybutt manifold (SB1 manifold) was installed near the WB2A ST1 well. The flowlines and control umbilical to and from the FPSO were reconfigured to connect WB2A ST1 directly to the new manifold. Separate flowlines and control umbilicals from WB2A ST1 and SB1 were then run from these wells to the new manifold. WB1A ST1 remained unchanged and was directly connected to the FPSO.
3. The Woollybutt-4 (WB4) and Woollybutt-6 (WB6) wells were added in 2008. The results from WB6, when drilled, were found to be less productive than expected and WB6 was not completed. Only WBT4 was tied back to SB1 manifold. The production fluid from WB4, WB2A ST1 and SB1 were commingled at the SB1 manifold and routed to the FPSO through the single 6-inch flexible flowline and riser. Similarly, gas lift was distributed from the FPSO via a single 2” flowline system and riser to the SB1 manifold, and then to each well. A Control Distribution Unit (CDU) was installed at WB2A ST1 location to assume control of the SB1 and WB2A ST1 wells and to provide dual redundancy in the operation of the subsea control system.

## 3.3 Operational Area

The Operational Area defines the spatial boundary of the Petroleum Activities Program, as described, risk assessed and managed by this EP. The Operational Area encompasses Permit Area WA-25-L (Figure 1-1).

Vessels conducting related activities within the Operational Area will be required to comply with this EP. Outside the Operational Area, maritime regulations and other requirements will apply.

## 3.4 Schedule

### 3.4.1 Field Management

Field management activities will be conducted at the frequencies outlined in Table 3-1. Further details on the field management scope of works are provided in Section 3.6.

**Table 3-1: Proposed field management activities with indicative frequencies and durations**

| Activity | Equipment | Frequency | Approx. Duration (days) |
|---|---|---|---|
| Inspection, maintenance, monitoring and repair and ROV survey | All Woollybutt subsea infrastructure | All other infrastructure as per the Woollybutt IMP (20-061-PL-001) | 7-14 days |
| Tree cleaning (pre-well P&A) | Subsea HXTs | Once-off, several months before P&A. | 15-20 days |

The Woollybutt IMP (20-061-PL-001) requirements and frequencies are based on regulatory requirements where applicable, good industry practice and results from Eni Risk Assessment workshops that have been conducted and continue for the subsea infrastructure.

Additional inspections may be performed following significant external events (e.g. cyclones, third-party interactions) or when an anomalous condition has been reported.

### 3.4.2 Plug & Abandonment

P&A activities will be conducted as per the indicative schedule outlined in Table 3-2. Further details on the P&A scope are provided in Section 3.7.

Planning for the P&A activities is targeting an execution window of the Q4 2021, subject to project variables including vessel availability, regulatory approvals and weather. It is anticipated P&A of each well will take approximately ten to 30 days.

**Table 3-2: Schedule for P&A of wells**

| Well | Schedule |
|---|---|
| Scalybutt-1 & side-track 1H (SB1 & SB1H) | Shut-in production wells – targeting an execution window of Q4 2021 (and completion by 31 December 2021), subject to project variables including but not limited to vessel availability, regulatory approvals and weather. |
| Woollybutt-4 (WB4) & side-track 4H (WB4H) | |
| Woollybutt-2A ST3 (WB2A ST3) | |
| Woollybutt-1H ST1 (WB1H ST1) | |
| Woollybutt-3A (WB3A) | Pending closure against the WOMP. Any incremental scope may be performed in the same campaign as above. |
| Woollybutt-5A (WB5A) | |
| Woollybutt-6H (WB6H) | |

All wellheads at the above wells will be removed.

The P&A target date is expedited and is set based on:

- engineering assessments to define the P&A methodology
- regulatory approvals timeframes
- tender and procurement timeframes.

These activities are ongoing.

A detailed inventory of the Woollybutt wellheads and current status is provided in Section 3.5.1, Table 3-3, and Appendix B.

### 3.4.3 Equipment Recovery

Subsea equipment recovery activities (refer to Section 3.8) are planned to follow the P&A campaign, as scheduled in Section 3.4.2. Subsea equipment recovery activities may be undertaken as an integrated campaign with P&A, or in a separate campaign shortly after or within the execution window described in Table 3-2. However, will be completed within 12 months of completing P&A, subject to project variables including but not limited to vessel availability, regulatory approvals and weather.

The activity is anticipated to take approximately 20 to 30 days in total.

A detailed inventory of equipment to be removed under this scope is provided in Section 3.8 and Appendix B.

### 3.4.4 Decommissioning

The following infrastructure is not included in the equipment recovery scope (described in Sections 3.4.3 and 3.8), and is subject to future decommissioning:

- Mooring anchors and chains
- Umbilical crossing mattresses

- Umbilicals and jumpers
- Flexible flowlines and jumpers.

The decommissioning of the above-listed infrastructure will be covered under a separate EP submission at a later date, to allow ongoing decommissioning studies to be completed.

All Woollybutt infrastructure will be removed within 12 months of completing P&A scope, in accordance with Section 572(3) of the OPGGS Act, unless NOPSEMA approves and is satisfied that an alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared with complete removal.

The removal methodology for the remaining infrastructure described above, is understood from prior feasibilities studies. In the instance that a decommissioning options assessment shows there is a better environmental outcome from completely removing the infrastructure, the contracting strategy for the P&A and equipment recovery activity scopes includes an option for the full removal of the infrastructure. This ensures resources can be available to remove remaining infrastructure within 12 months of completing P&A, if required.

A detailed inventory of all the Woollybutt field infrastructure and decommissioning schedule is included in Appendix B.

Until decommissioning, field management will be undertaken in accordance with the Woollybutt IMP (20-061-PL-001) as described in Section 3.4.1 to ensure that remaining subsea infrastructure is maintained in good condition to allow for a range of decommissioning options to be assessed and the optimal strategy to be realised. This will ensure compliance with obligations under OPGGS Act, including:

- section 572(2)) to 'maintain in good condition and repair all structures that are, and all equipment and other property that is, in the title area and used in connection with the operations'
- section 572(3) to 'remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations in which the titleholder is or will be engaged; and that are authorised by the permit, lease, licence or authority' (unless otherwise approved by NOPSEMA).

Decommissioning studies are ongoing, including environmental studies to determine the optimal decommissioning strategy to achieve the best environmental outcome.

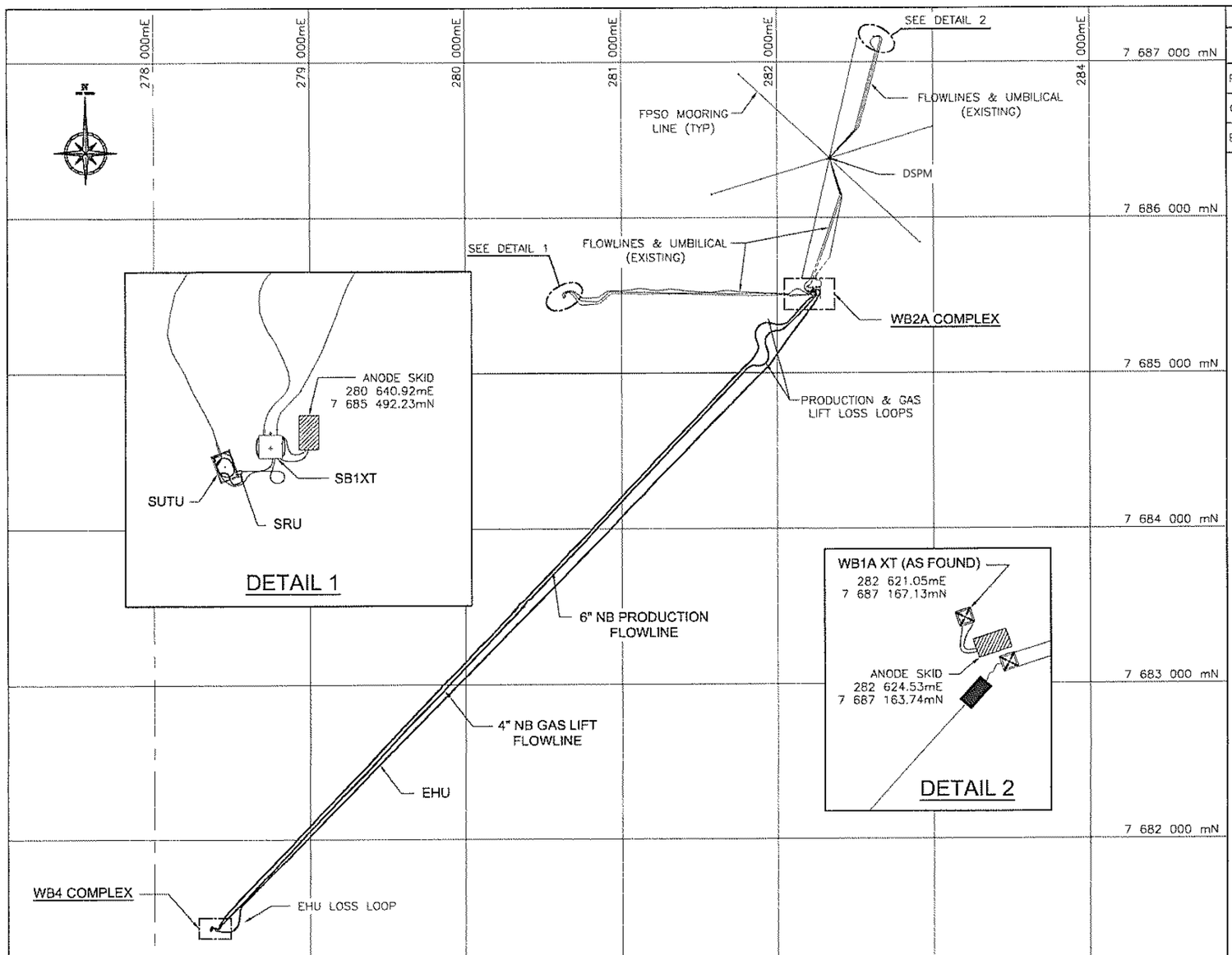
## 3.5 Field Infrastructure

The infrastructure within the Woollybutt field includes:

- wellheads (WH) and horizontal Xmas trees
- subsea production manifolds
- umbilical termination assembly (UTA)
- control distribution unit (CDU)
- disconnectable single point mooring (DSPM)

- north and south mid-depth buoy system, including gravity bases and tether chains (note, the mid-depth buoys themselves and a proportion of the chains have already been removed from the field)
- subsea umbilical termination units (SUTU)
- anode skids
- flowline transition guide base
- Stevshark mooring anchors weighing 35 Te
- anchor chains
- umbilical crossing mattresses
- umbilicals
- six-inch flexible flowlines
- gas reinjection flowlines (2 ½" and 4").

The full list of Woollybutt subsea infrastructure and the decommissioning schedule are presented in Appendix B, and the field layout is shown in Figure 3-1.




LINE INFORMATION

| SERVICES | REEL MARKING | LENGTH DESIGNED | LENGTH ORDERED | REFERENCE DRAWING |
|---|---|---|---|---|
| PRODUCTION | 2724NKT 001 & 002 | 5670.5m | 5750.0m | SED89005-1 |
| GAS LIFT | 2724NKT 006 & 007 | 5647.0m | 5750.0m | SED89006-1 |
| EHU | HU0627 | 5656.4m | 5750.0m | SED89007-1 |

**GENERAL NOTES**

1. ALL DIMENSIONS ARE IN m U.N.O
2. THIS DRAWING HAS BEEN DEVELOPED BASE ON FMC DWG DM400008555 SHT. 1-3.
3. GRIDLINE MARKING ABSTRACTED FROM FIELD LAYOUT GA DWG. #266-DV-01-0020 REV.0
4. ANODE SKID SHALL BE INSTALLED WITHIN APPROXIMATELY 2m TO XTREE.

**GEODETIC PARAMETER**

| | |
|---|---|
| GEODETIC DATUM | GEOCENTRIC DATUM OF AUSTRALIA 1994 (GDA 94) |
| ELLIPSOID | GEODETIC REFERENCE SYSTEM (GRS80) |
| SEMI MAJOR AXIS | 6378137.000m |
| INVERSE FLATTENING | 298.257222101 |
| GRID | MAP GRID OF AUSTRALIA 1994 (MGA94) |
| PROJECTION | TRANSVERSE MERCATOR |
| CENTRAL MERIDIAN (CM) | 117° E (UTM ZONE 50) |
| LATITUDE OF ORIGIN | 0° N |
| FALSEmEASTING | 500 000m |
| FALSEmNORTHING | 10 000 000m |
| SCALE FACTOR AT CM | 0.9996 |

**THE NEW FACILITIES FIELD LAYOUT DRAWING IS AN ABSTRACT FROM AS BUILT DRAWING NO P087_002**

DO NOT SCALE

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IF IN DOUBT ASK

ACCEPTANCE OF THIS DOCUMENT BY ENI DOES NOT RELEVE THE CONTRACTOR OF ITS OBLIGATION UNDER THE CONTRACT

1. REVIEWED PROCEED
2. REVIEWED PROCEED MAKE CHANGES AS NOTED & RESUBMIT
3. MAJOR IMPROVEMENT REQUIRED, REVISED & RESUBMIT
4. INFORMATION ONLY
5. AS-BUILT

SIGNED.....

DATE.....

DOC NUMBER: 007104_00_D.U.DQ.0004.001 REV A02

| Rev | Date | Description | By | Chk'd | Engr. | Project |
|---|---|---|---|---|---|---|
| Z1 | 24.03.09 | AS BUILT | AHM | KS | KS | |
| C1 | 27.03.08 | APPROVED FOR CONSTRUCTION | ROL | KS | RON | |
| A1 | 25.03.08 | ISSUED FOR INTERNAL REVIEW | ROL | KS | RON | |

| Discipline Engr | Discipline Mngr | Client Approval |
|---|---|---|
| EC | SD | - |
| Date | Date | Date |
| 24.03.09 | 24.03.09 | - |
| Draughtsman | Checker | Originator |
| AHM | KS | EC |
| Date | Date | Date |
| 24.03.09 | 24.03.09 | 24.03.09 |

Client: Eni Australia Ltd

Technip Subsea 7 Asia Pacific



Project: WOOLLYBUTT SOUTH LOBE DEVELOPMENT PROJECT

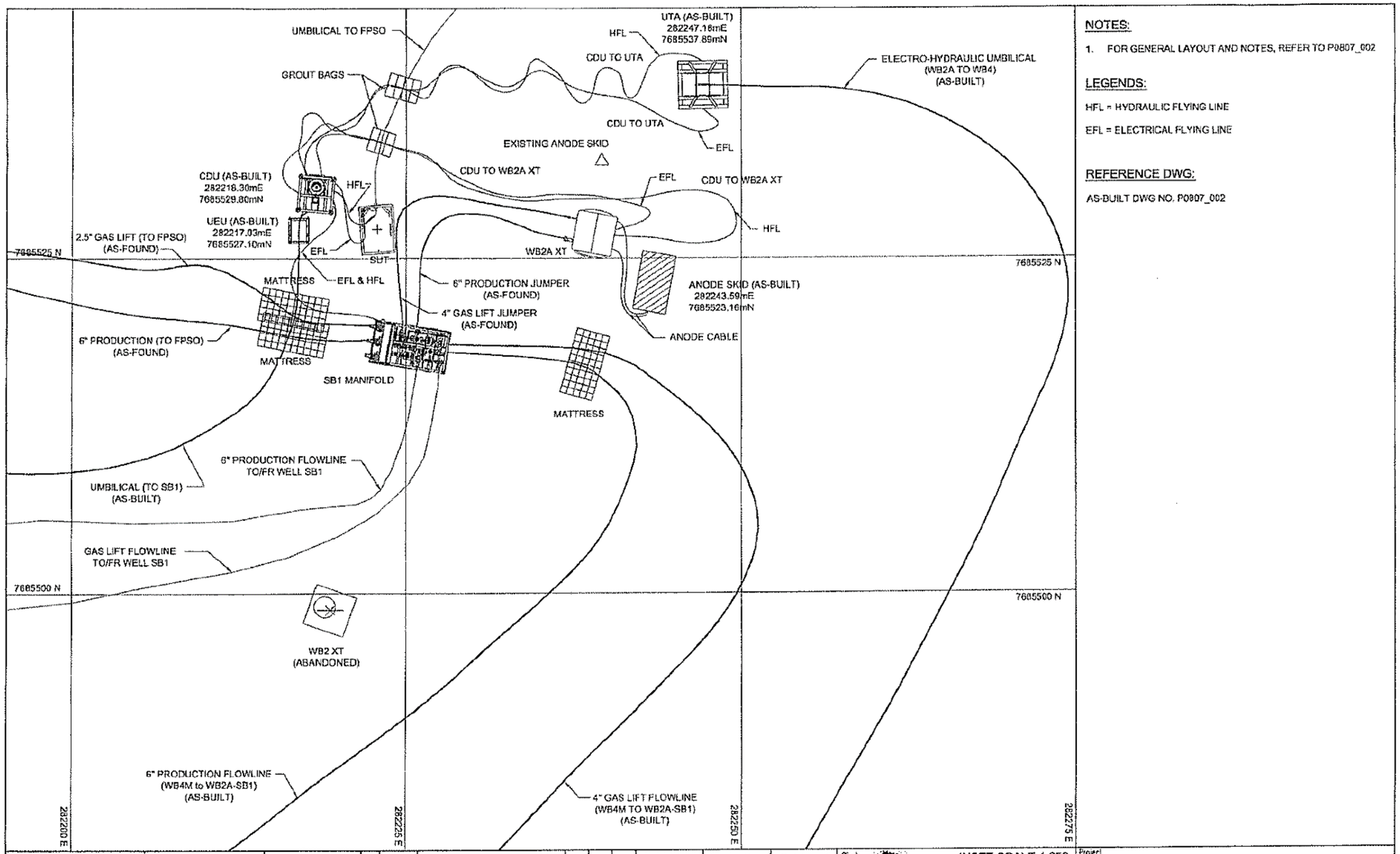
Dwg Title: NEW FACILITIES FIELD LAYOUT (AS BUILT) (SHT. 1 OF 3)

Sheet Size: A3

Dwg Scale: 1:20

Dwg & CAD File No: SED89004-1

Rev: Z1




NOTES:

1. FOR GENERAL LAYOUT AND NOTES, REFER TO P0807_002

LEGENDS:

HFL = HYDRAULIC FLYING LINE

EFL = ELECTRICAL FLYING LINE

REFERENCE DWG:

AS-BUILT DWG NO. P0807_002

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SIGNED .....

DATE .....

DOC NUMBER 007104_00_D.U.DQ.0004.000-2 REV A02

| Rev | Date | Description | By | Chkd Eng. | App Project |
|---|---|---|---|---|---|
| Z1 | 20.11.08 | AS BUILT | ROL | KS | KS |
| C2 | 23.07.08 | RE-ISSUED FOR CONSTRUCTION | ROL | KS | SD |
| C1 | 27.03.08 | APPROVED FOR CONSTRUCTION | ROL | KS | RON |
| A1 | 26.03.08 | ISSUED FOR INTERNAL REVIEW | ROL | KS | RON |

| Discipline Engr | Discipline Mngr | Client Approval |
|---|---|---|
| EC | SD | - |
| Date | Date | Date |
| 20.11.08 | 20.11.08 | - |
| Draughtsman | Checker | Originator |
| ROL | KS | EC |
| Date | Date | Date |
| 20.11.08 | 20.11.08 | 20.11.08 |

Client: Eni

INSET SCALE 1:250
Eni Australia Ltd

Technip
SUBSEA 7
Asia Pacific



Project: WOOLLYBUTT SOUTH LOBE DEVELOPMENT PROJECT

Dwg Title: NEW FACILITIES FIELD LAYOUT
WB2A COMPLEX (AS BUILT)

Sheet Size: A3
Dwg Scale: 1: 20
Dwg & CAD File No: SED89004-2
Rev: Z1

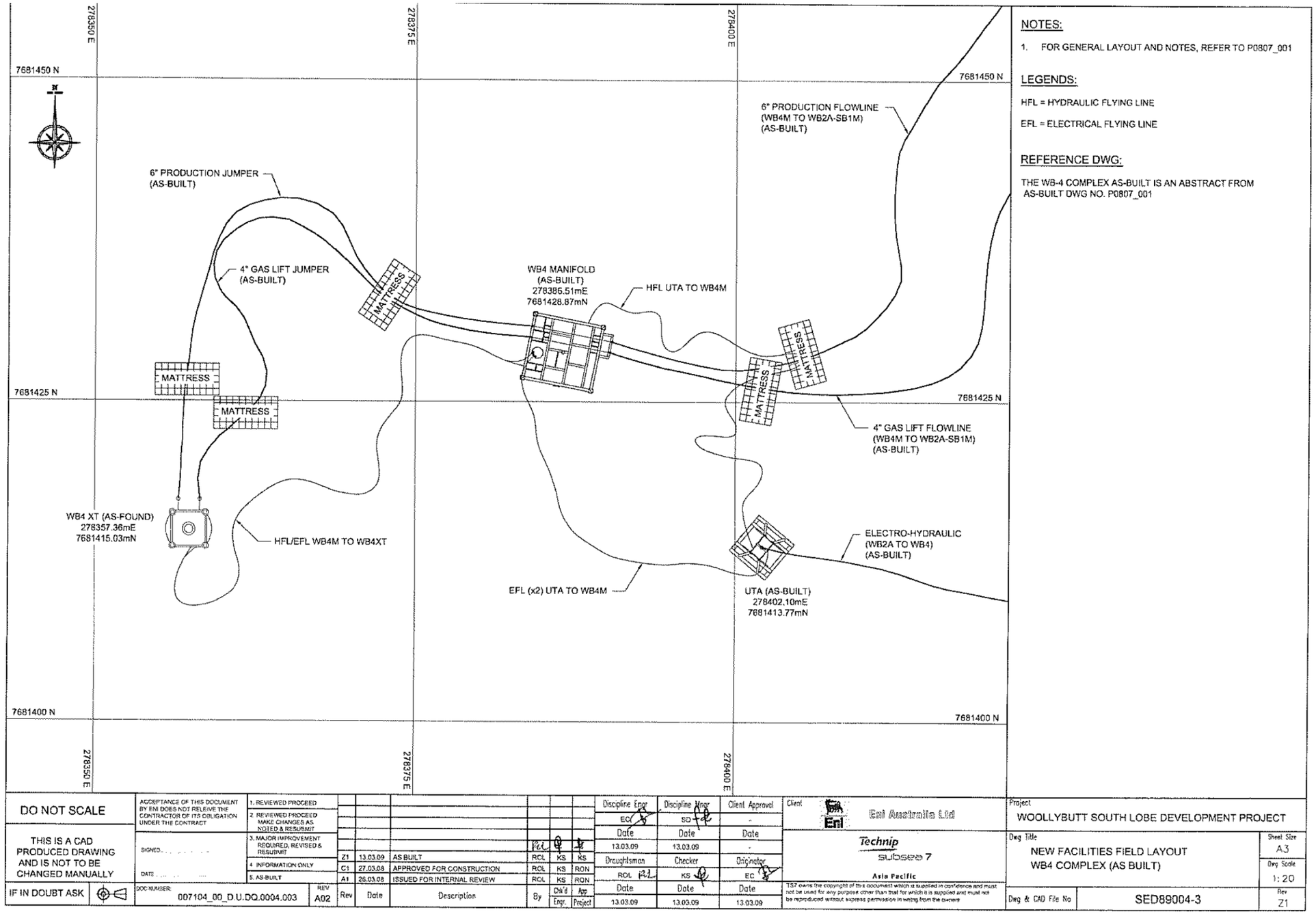



**Figure 3-1: Woollybutt field layout**

### 3.5.1 Subsea Wells within WA-25-L

The wells present in the Operational Area are identified in Table 3-3. A number of these wells have associated subsea infrastructure.

Three wells (West Barrow 1, West Barrow 1A and West Barrow 2) pre-date the chain of title culminating in Licence WA-25-L and are therefore not the responsibility of the WA-25-L titleholders.

**Table 3-3: Wells within WA-25-L**

| Well Name | Subsea Infrastructure | Well status | Eastings | Northings | Longitude | Latitude |
|---|---|---|---|---|---|---|
| **Shut-in production wells – Confirmed wells to be plug and abandoned** | | | | | | |
| Scalybutt-1 | WH + HXT | Suspended | 280636 | 7685490 | 114.8908114 | -20.9179536 |
| Scalybutt-1H | | Completed | | | | |
| Woollybutt-4 | WH + HXT | Suspended | 278357 | 7681413 | 114.86837 | -20.95450 |
| Woollybutt-4H | | Completed | | | | |
| Woollybutt-2A | WH + HXT | Suspended | 282241 | 7685527 | 114.906229 | -20.917834 |
| Woollybutt-2A ST1 | | Suspended | | | | |
| Woollybutt-2A ST2 | | Abandoned | | | | |
| Woollybutt-2A ST3 | | Completed | | | | |
| Woollybutt-1 | WH + HXT | Suspended | 282483 | 7687011 | 114.9101058 | -20.9030635 |
| Woollybutt-1H | | Abandoned | | | | |
| Woollybutt-1H ST1 | | Completed | | | | |
| **Suspended wells – May require additional scope subject to close out against the WOMP (000105_DV_PR.D&C.1028.000)** | | | | | | |
| Woollybutt-3A | WH & debris cap | Suspended | - | - | 114.874815 | -20.966004 |
| Woollybutt-5A | WH & debris cap | Suspended | 277733 | 7676364 | 114.8617278 | -21.0000167 |
| Woollybutt-6H | WH & debris cap | Abandoned | 279026 | 7678821 | 114.874466 | -20.9743056 |
| Woollybutt-6H ST1 | | Suspended | | | | |

| Well Name | Subsea Infrastructure | Well status | Eastings | Northings | Longitude | Latitude |
|---|---|---|---|---|---|---|
| **Abandoned wells – subject to decommissioning as part of WA-25-L (refer to Section 3.4.4)** | | | | | | |
| Woollybutt-5 | PGB & WH<br>Conductor protruding 2 m vertically from seabed | Abandoned | 277733 | 7676364 | 114.861925 | -21.0000194 |
| Woollybutt-3 | Nil | Abandoned | 279041 | 7680149 | 114.87479 | -20.96600 |
| Woollybutt-2 | PGB & WH | Abandoned | 282219 | 7685499 | 114.9058766 | -20.9180616 |
| Corkybark-1 | PGB & WH (no posts) | Abandoned | 289233 | 7688393 | 114.9736806 | -20.8928668 |
| Corkybark-1A<br>Corkybark-1AST1 | Nil | Abandoned and wellhead removed | - | - | 114.9738045 | -20.8927532 |
| Kurrajong-1 | Nil | Abandoned and wellhead removed | 286119 | 7693045 | 114.94445 | -20.850386 |
| Yarri-1 | Nil | Abandoned and wellhead removed | 283858 | 7679290 | 114.9209917 | -20.9743056 |
| **Suspended wells – pre-dates WA-25-L*** | | | | | | |
| West Barrow-1A | WH & debris cap | Suspended | 283065 | 7688528 | 114.916023 | -20.889399 |
| **Abandoned wells – pre-date WA-25-L*** | | | | | | |
| West Barrow-1 | Nil | Abandoned | 283217 | 7688689 | 114.916265 | -20.889741 |
| West Barrow-2<br>West Barrow-2 ST1 | Nil | Abandoned | 284333 | 7687643 | 114.9279482 | -20.8976642 |

*Note: Pre-date the chain of title culminating in licence WA-25-L and are therefore not the responsibility of the WA-25-L titleholders

PGB = permanent guide base; WH = wellhead; HXT = horizontal christmas tree

#### 3.5.1.1 Shut-In Production Wells to be P&A

Four production wells within the Woollybutt field are shut in and require P&A (as per Section 3.7.1):

- Scalybutt-1 (SB1) and side-track (SB1H)
- Woollybutt-4 (WB4) and side-track (WB4H)
- Woollybutt-2A ST3 (WB2A ST3)
- Woollybutt-1H ST1 (WB1H ST1).

WHs and guide-bases remaining at these wells will be recovered as per Section 3.8.2.

A 500 m Petroleum Safety Zone (PSZ) is maintained around each of these wells. Each well is fitted with steel pipe (casing) in decreasing hole diameter sections (Figure 3-2). The wells include a high-pressure WH, a Horizontal Xmas Tree (HXT), assembly of valves, spools, and fittings, and internal tubing string and sub-surface safety valve (SSSV). Each HXT is also fitted with a protective debris tree cap, to deflect minor dropped objects.

Following cessation of production in May 2012, the production and gas lift lines were flushed of hydrocarbons. Well annuli and tubing were not displaced to seawater due to FPSO operator not permitting a HP pump aboard. No fluids were pumped downhole. The FPSO was disconnected following shut in of the wells at the Sub Surface Safety Valve (SSSVs) and HXT valves. The HXT valves were pressure tested to confirm the presence of sufficient barriers for well suspension. Of the four wells, only Woollybutt-4 (WB4) can naturally flow.

The HXTs (Figure 3-3) controlled the flow of the reservoir fluids out of the wells and the injection of gas into the wells. They also allowed chemical injection and monitoring of the wells. The HXTs have been designed for a 20 tonne snag load, 15 kJ impact load and have been designed to the relevant API specification:

- Pressure rating: 5000 psi.
- Temperature rating: -29 °C to 124 °C).
- Materials: Class EE with requirements of NACE MR0175 (National Association of Corrosion Engineers).

Since the FPSO sailed away from the field in 2012, these wells have had CP and GVI by ROV multiple times and are under fortnightly surveillance from satellites, monitoring for any surface oil sheen as indication of leaks.

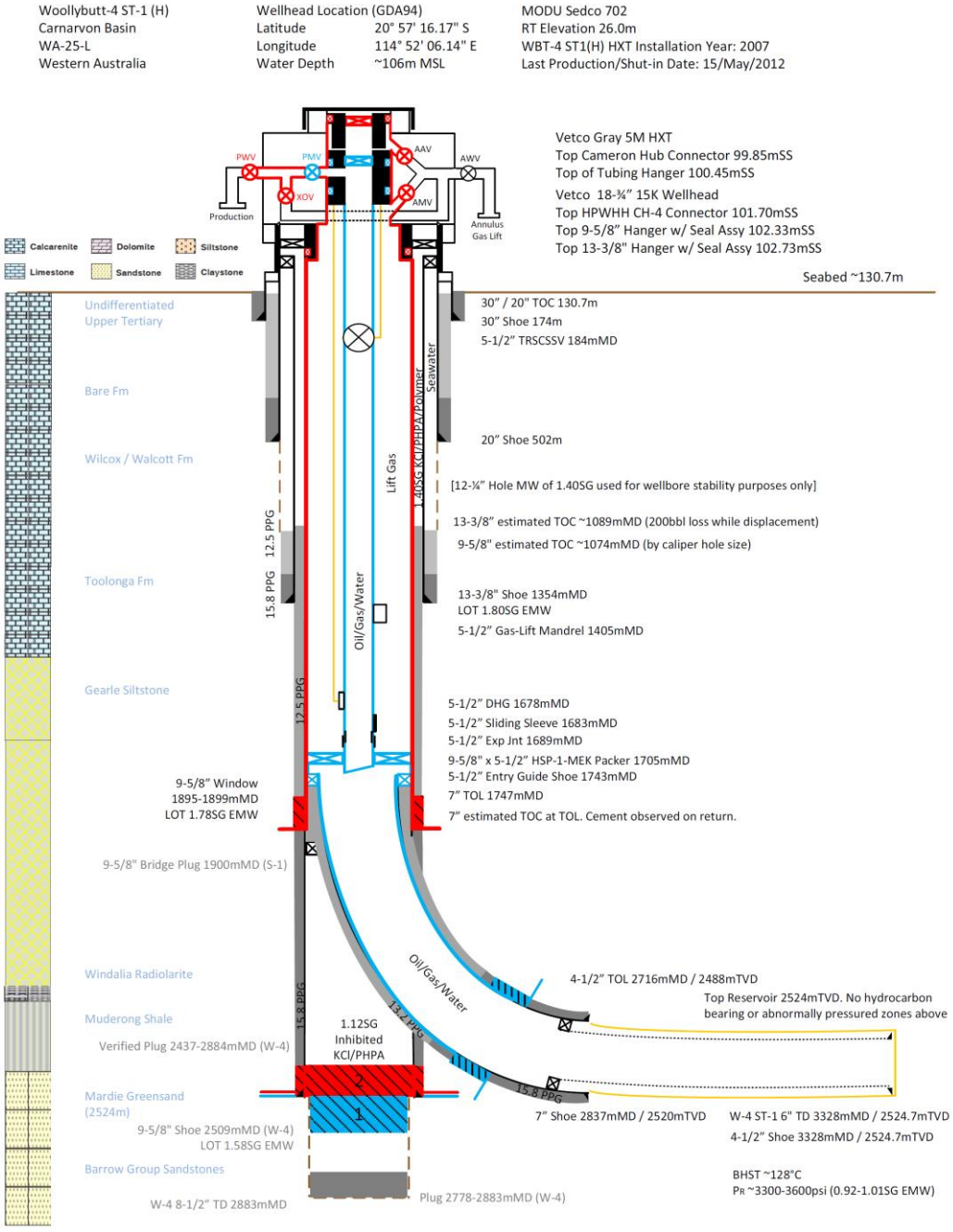



**Figure 3-2: Shut-in production wells schematic (WB4 presented as example)**

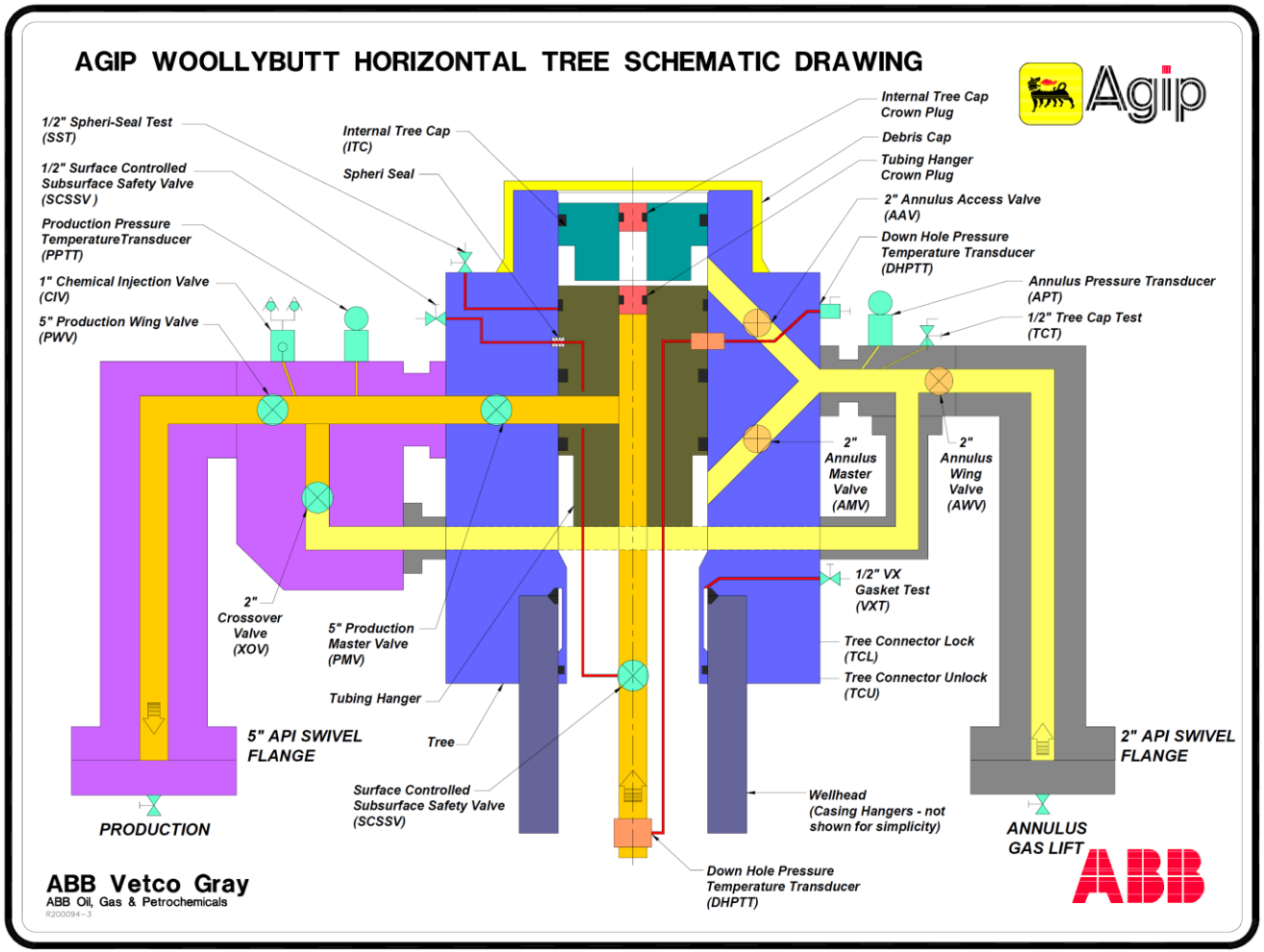
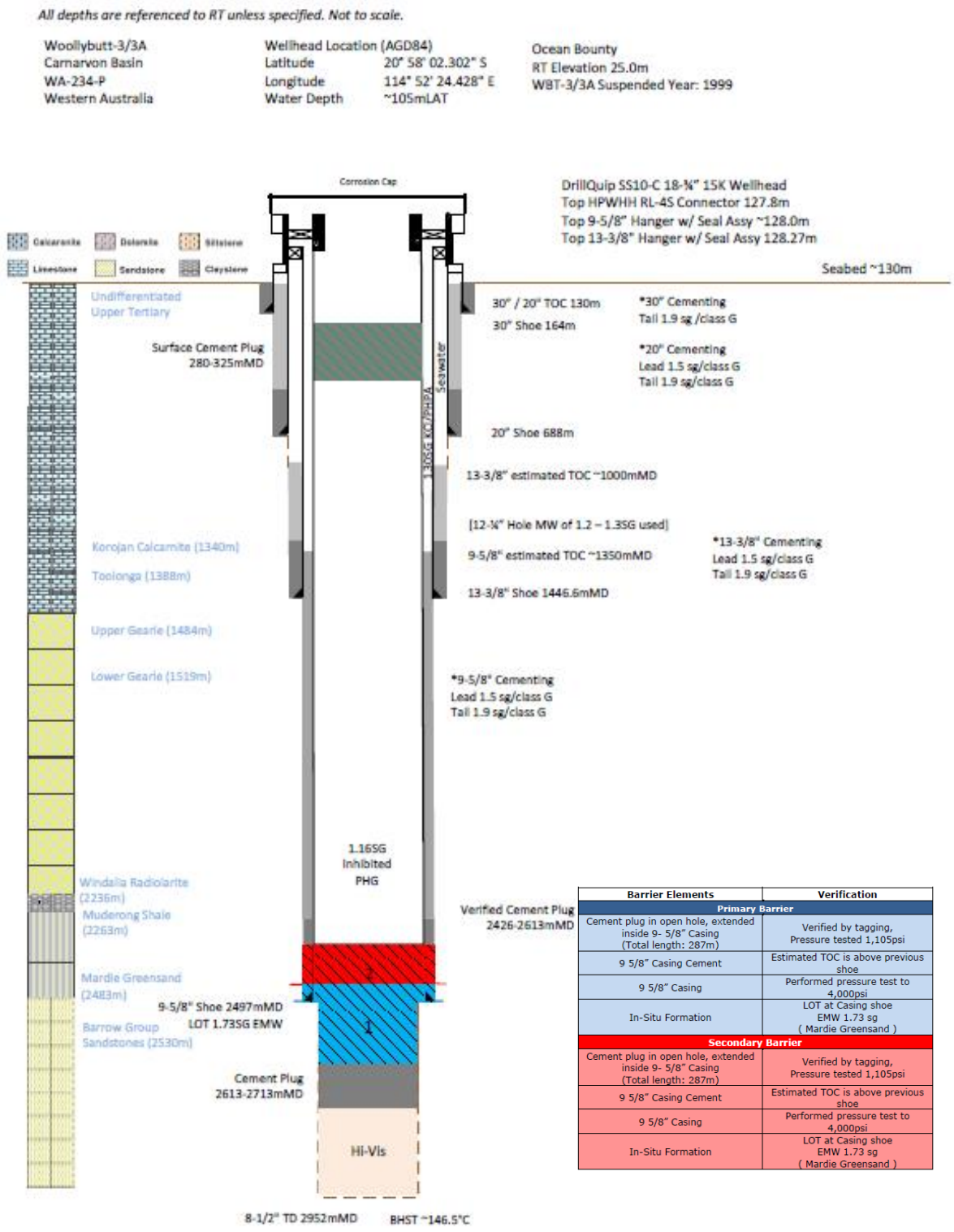



**Figure 3-3: HXT schematic**

#### 3.5.1.2 Suspended Non-Production Wells

The WOMP (000105_DV_PR.D&C.1028.000) lists the WB3A, WB5A and WB6H wells as suspended. The well schematics in the WOMP detail the verified primary and secondary barrier envelopes and Eni considers these wells as already permanently abandoned. WB3A, WB5A and WB6H WH and guide-base removal will occur during the P&A campaign (Section 3.4.2), the procedure for their recovery is included in Section 3.8.2.

As contingency, this EP conservatively considers any potential scope on these wells that may be required to close out the WOMP (000105_DV_PR.D&C.1028.000). The barrier schematics of one of these wells is provided in Figure 3-4 as an example.




| Barrier Elements | Verification |
|---|---|
| **Primary Barrier** | |
| Cement plug in open hole, extended inside 9- 5/8" Casing (Total length: 287m) | Verified by tagging, Pressure tested 1,105psi |
| 9 5/8" Casing Cement | Estimated TOC is above previous shoe |
| 9 5/8" Casing | Performed pressure test to 4,000psi |
| In-Situ Formation | LOT at Casing shoe EMW 1.73 sg ( Mardie Greensand ) |
| **Secondary Barrier** | |
| Cement plug in open hole, extended inside 9- 5/8" Casing (Total length: 287m) | Verified by tagging, Pressure tested 1,105psi |
| 9 5/8" Casing Cement | Estimated TOC is above previous shoe |
| 9 5/8" Casing | Performed pressure test to 4,000psi |
| In-Situ Formation | LOT at Casing shoe EMW 1.73 sg ( Mardie Greensand ) |

**Figure 3-4: Suspended wells schematic example**

#### 3.5.1.3 Abandoned Wells

The following abandoned wells have WHs and guide-bases remaining which will be removed as per Section 3.8.2 as part of the equipment recovery scope (Section 3.4.3):

- Woollybutt 5 (WB5)
- Woollybutt 2 (WB2)

The Corkybark-1 (CB1) wellhead will be left in-situ, the decision making process leading to this outcome is discussed below.

#### 3.5.1.4 Corkybark-1

Overview

Corkybark-1 (CB1) is an abandoned well with a guide base remaining. The well was drilled in 2000 to a depth of 572m where the hole was lost after the drill pipe became stuck and could not be recovered. It was abandoned as a dry well in accordance with Designated Authority approval.

The guideposts were removed from the wellhead guide base. The total structure extends approximately 1.3 m above the seabed.

A survey of the wellhead was conducted in September 2020 and observed the following:

- No abandonment cap or guideposts were present
- No leaks were observed emanating from the conductor pipe or adjacent seabed
- No signs of damage or debris were observed on the guide base, conductor pipe or adjacent seabed.
- A section of drill pipe fish was observed inside the conductor pipe and in contact with the northwest side approximately 0.15m above the top.
- No anodes were observed on the guide base.
- Isolated areas of surface decolourisation were observed on the north face of the guide base.
- No scour was observed, with the guide base approximately 0.15m above the surrounding seabed on all four faces.
- Marine growth coverage was approximately 100%: 40% hard and 80% soft growth.
- The guide base appeared to be level, with the conductor below the guide base 100% buried.

The CB1 wellhead and guide base are made of steel, comprising of approximately 98% iron and minor quantities of carbon, manganese and chromium. The exposed surface is coated with Two-Part Epoxy, a zinc resin. NORMs are not considered to be present. Figure 3-5 to Figure 3-8 show the wellhead and guide base on the seabed.


**Figure 3-5: CB1 conductor pipe and guide base**


**Figure 3-6: CB1 isolated corrosion on north face of guide base**


**Figure 3-7: CB1 drill string inside conductor pipe on NW side**


**Figure 3-8: CB1 seabed clearance**

Decommissioning options assessment

A decommissioning options assessment for the CB1 wellhead and guide base was conducted for five decommissioning options, detailed in Table 3-4.

**Table 3-4: Corkybark-1 wellhead and guide base decommissioning options**

| Option | Summary of activities |
|---|---|
| Full removal | <u>Removal of the wellhead and guide base</u><br>During well abandonment of Corkybark-1 in 2000, an attempt was made to recover the guide base during the well P&A, using a PGB retrieval tool, but it could not be released. Permission was received from the Designated Authority at the time, Department of Mines and Energy, to abandon Corkybark-1 leaving the guide base less guideposts, and the 762mm (30") housing in place and the well was abandoned accordingly, as documented in the Corkybark-1 Well Completion Report (Eni, 2000).<br><br>With the wellhead cemented internally to just below the top of the housing (exact depth unknown), and having 5" drill pipe extending to approximately 0.15m above the wellhead, internal cutting of the wellhead is not possible, either by mechanically cutting or by abrasive cutting methods. Cutting the wellhead externally is equally problematic, with the guide base sitting very close to the seabed, making access underneath for a cutting machine impossible without extensive dredging under the guide base, which in itself will be difficult, as an ROV will have to be close to the seabed and will stir up sediment, reducing visibility to zero.<br><br>The following summarise the activities required to remove the wellhead and guide base:<br>1. Mobilisation of vessel (similar to that described in Section 3.10)<br>2. Deploy ROV to dredge area under the guide base, so access to the wellhead can be made<br>3. Manoeuvre the ROV, equipped with cutting equipment to access the wellhead externally<br>4. Cut wellhead<br>5. Retrieve the wellhead and guide base from the seabed (using the method described in Section 3.8.2) and complete as left survey. |
| Partial removal | <u>Removal of the guide base only</u><br>It is possible to remove the guide base without dredging and this is described below:<br>The following summarise the activities required:<br>1. Mobilisation of vessel (similar to that described in Section 3.10)<br>2. Deploy ROV, equipped with cutting tool to cut pieces of the guide base from the vessel<br>3. Mechanically cut the guide base into retrievable pieces.<br>4. Retrieve the guide base pieces from the seabed (using the method described in Section 3.8.2) and complete as left survey. Approximately four lifts required to remove guide base pieces. |
| Leave in-situ with over-trawlable structure | <u>Installation of an over-trawlable structure</u><br>Installation of an over-trawlable structure has been used in the fishing industry to manage seabed obstacles.<br>The following summarise the activities required for installation of an over-trawlable structure:<br>1. Mobilisation of a diving support vessel with work class ROV and crane (similar to that described in Section 3.10).<br>2. Deploy ROV.<br>3. Use vessel crane to lift and place the structure over the wellhead, and if required, secure to the wellhead using the ROV.<br>The over-trawlable structure must be suitable designed for the wellhead and environmental conditions.<br>Following placement of the over-trawlable structure, the wellhead will be left in place on seabed. An over-trawl test may be required to demonstrate there is no residual snag risk, which would require additional vessel activity. |
| Leave in-situ with rock dumping | <u>Rock dumping over the wellhead</u><br>Rock dumping is another options for potentially reducing the snag risk and potential for interference with trawl fishing gear.<br>The following summarise the activities required for rock dumping:<br>1. Mobilisation of a diving support vessel with a fallpipe or rock bulk bag handling frame (similar size to that described in Section 3.10).<br>2. Deploy ROV, which will position the fall pipe or rock bulk bag handling frame in place.<br>3. Place rocks over and surrounding the structure.<br>Following placement of the rock dumping, the wellhead will be left in place on seabed. An over-trawl test may be required to demonstrate there is no residual snag risk, which would require additional vessel activity. |
| Leave in-situ | No field activities are required. Wellhead left in place. |

For the decommissioning options identified in Table 3-4 the following criteria was assessed:

- Technical feasibility – the ability to technically achieve the option
- Health and safety– the risks to personnel both onshore and offshore relating to achieving the option
- Environment– the consequences and risk to the environment achieving the option
- Social – the risk to stakeholders achieving the option, including commercial fishing operations

The criteria used to categorise each of the above criteria is presented in Table 3-5. Definitions have been developed in consideration of the Oil and Gas UK Guidelines for Comparative Assessment in Decommissioning Programmes Issue 1 (2015).

Table 3-6 summarises options assessment using the criteria for the three decommissioning options.

**Table 3-5: Assessment criteria definitions**

| Criteria | Definition | Definition |
|---|---|---|
| **Technical feasibility** | **Low Complexity** | • Engineering feasibility of the concept is well understood.<br>• Low technical risk<br>• The concept has proven successful in the past |
| | **Moderate Complexity** | • Engineering feasibility of the concept is expected to have challenging complexities and uncertainty<br>• Moderate level of technical risk<br>• There are examples of the concept being used in industry in the past |
| | **High Complexity** | • Engineering feasibility of the concept is not well understood or has not been used in the past<br>• High level of technical risk<br>• The concept has not been proven successful in the past |
| **Health and Safety** | The health and safety assessment is based on the descriptors within the Eni risk Matrix (Figure 6-1) | |
| **Environment** | The environmental assessment is based on the methodology described in Section 6, the consequence descriptors in Table 6-2 and the Eni risk Matrix (Figure 6-1) | |
| **Social** | The social assessment is based on the methodology described in Section 6, the consequence descriptors in Table 6-2 the Eni risk Matrix (Figure 6-1) | |

**Table 3-6: Decommissioning options screening assessment for technical feasibility**

| Option | Technical feasbility | Health and saftey | Environment | Social | Comments | Recommendation |
|---|---|---|---|---|---|---|
| Complete Removal | Moderate complexity | Medium | Low | Slight | Complete removal of the CB1 wellhead and guide base is the base case decommissioning option under OPGGS Act.<br><br>Technical feasibility:<br><br>As described in Table 3-4, the complete removal option requires dredging under the guide base. Once the ROV performs the dredging activities to get access to the wellhead, the ROV will have to perform the cutting externally, in close to the seabed which will stir up sediment, reducing visibility to zero.<br><br>In summary, this option is technically challenging due to:<br><br>- The dredging activity that would be required to get access to the wellhead externally<br>- The movement of the sand once the dredging has been performed, which could mean further dredging is required to gain access to the wellhead.<br>- Reduced visibility during the wellhead cutting activity which could make cutting problematic<br><br>Once the dredging activity and external wellhead cutting is performed the wellhead and guide base can be removed from the seabed as per the method described in Section 3.8.2.<br><br>Health and safety:<br><br>Wellhead removal requires the use of a vessel (similar to that described in Section 3.10) and therefore has associated health and safety risks (with the potential to cause injury to personnel or fatalities). These are broadly summarised below:<br><br>1. Vessel collision risks<br>2. Loss of control of lifting equipment (e.g. crane) when retrieving the wellhead and guide base<br>3. Offshore occupational and manual handling hazards<br><br>Environment: | ***Not recommended*** |

| Option | Technical feasbility | Health and saftey | Environment | Social | Comments | Recommendation |
|---|---|---|---|---|---|---|
| | | | | | Potential impacts relate to the disturbance of sediments during dredging under the guide base which will lead to localised and temporary elevated turbidity and clogging of respiratory and feeding parts (turbidity) of filter feeding organisms over the short term (during the activity).<br><br>Seabed disturbance activities will result in some temporary low impacts to benthic communities around the wellhead and guide base.<br><br>Wellhead removal requires the use of a vessel (similar to that described in Section 3.10) to deploy an ROV and retrieve the wellhead. Specific risks associated with vessel and ROV use have been outlined in this EP and include:<br>• Interaction with other users (Risk ID 1)<br>• Underwater noise (Risk ID 2)<br>• Light emissions (Risk ID 3)<br>• Atmospheric Emissions (Risk ID 4)<br>• Discharges (Risk ID 5-7)<br>• Seabed alteration (Risk ID 8)<br>• Introduction of marine pests (Risk ID 9)<br>• Accidental loss of wastes (Risk ID 10)<br>• Collision with marine fauna (Risk ID 11)<br>• Vessel collision and diesel spills (Risk ID 13)<br><br><u>Social</u><br><br>Social impacts relate to interaction with other users from vessel used. As described in Interaction with other users (Risk ID 1). | |
| Partial removal (remove part of the wellhead or guide base) | Moderate complexity | Medium | Low | Slight | <u>Technical feasibility</u><br><br>As described above there is a case where the guide base can be remove through multiple cuts made by a ROV. However this is a technically complex activity given the position of the guide base on the seabed. Although the partial removal case removes the dredging requirement, the ROV thrusters would be so close to the seabed, they would disturb the sediment, reducing visibility to zero, making the work time consuming and the cutting activity problematic.<br><br><u>Health and safety:</u> | ***Not recommended*** |

| Option | Technical feasbility | Health and saftey | Environment | Social | Comments | Recommendation |
|---|---|---|---|---|---|---|
| | | | | | As per the full removal case.<br><u>Environmental:</u><br>As per the full removal case. This option, however, would not require the dredging under the guide base.<br><u>Social</u><br>As per the full removal case. | |
| Leave *in-situ with over-trawlable structure* | Medium complexity | Medium | Slight | Slight | <u>Technical feasibility</u><br>This is a moderately complex activity due to the requirement for lifting and precision required to place the over-trawlable structure over the wellhead.<br>In addition, the structure must be suitable designed to fit over the wellhead and withstand environmental conditions, and an over-trawling test may be required to confirm the structure is safe for trawling, requiring an additional vessel and offshore activity.<br><u>Health and safety:</u><br>As per the full removal case.<br><u>Environmental:</u><br>As per the full removal case. An over-trawl test may be required to demonstrate there is no residual snag risk, which would involve additional vessel activity and associated impacts. This option, however, would not require the dredging under the guide base.<br><u>Social</u><br>An over-trawlable structure is designed to enable trawling to safely occur over the structure with no risk of snagging. However there are a number of factors which could compromise its effectiveness, including scour, corrosion, and movement due to inclement weather. An over-trawlable structure would also add height to the overall structure. During stakeholder consultation, DPIRD Fisheries expressed the view that there is limited evidence demonstrating the long term effectiveness of over-trawlable structures, and their preference is for infrastructure to be marked on nautical charts. | ***Not recommended*** |

| Option | Technical feasbility | Health and saftey | Environment | Social | Comments | Recommendation |
|---|---|---|---|---|---|---|
| Leave *in-situ with rock dumping* | Medium complexity | Medium | Slight | Slight | Technical feasibility<br>This is a moderately complex activity due to the use of a fall pipe and precision required in the rock placement. The rocks must also be suitably sized to ensure stability but sufficiently small to ensure they do not pose an additional snag risk. An over-trawling test may be required to confirm the installation is safe for trawling, requiring an additional vessel and offshore activity.<br>Health and safety:<br>As per the full removal case.<br>Environmental:<br>As per the full removal case. An over-trawl test may be required to demonstrate there is no residual snag risk, which would involve additional vessel activity and associated impacts. This option, however, would not require the dredging under the guide base.<br>Social<br>Similar to the use of an over-trawlable structure, the 'trawlability' of the rock dump could be compromised by scour and movement of the rocks over time. | ***Not recommended*** |
| Leave *in-situ* | Low complexity | Low | Slight | Slight | Technical feasibility:<br>Leave in-situ has no technical risk.<br>Health and safety:<br>Leave in-situ has no health and safety risk.<br>Environment:<br>If wellheads are left in-situ risk associated with vessel use (required for complete removal) are eliminated.<br>The wellhead currently provides an area of hard substrate for marine habitat growth and shelter for marine fauna. As presented in Figure 3-5 to Figure 3-8, marine growth is establishing on the wellhead. Several studies undertaken on wellheads on the NWS have observed a reef dependant and transient pelagic species, including commercially fished species (Pradella et al. 2014; McLean et al. 2018). | ***Preferred Option*** |

| Option | Technical feasbility | Health and saftey | Environment | Social | Comments | Recommendation |
|---|---|---|---|---|---|---|
| | | | | | As the wellhead corrodes and degrades over the long term, the constituents making up the wellhead and guide base will be released to the environment. Iron, the main constituent of wellheads (about 98%) is not considered a significant contaminant in the marine environment and is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon 1997). Iron is also considered to Pose Little or No Risk to the Environment (PLONOR) as defined by OSPAR. Other constituents of the wellhead and guide base represent less than 1% of their composition and impacts to marine sediments, organisms are water quality as a result of their release are highly unlikely.<br><br>Given the low toxicity of corrosion products making up the wellhead and guide base, the slow release rate and rapid dilution of the open ocean environment, it is likely that any impacts to marine sediments, benthic habitats and water quality will be highly localised and slight over a long term period.<br><br>Given the well stopped drilling in the Undifferentiated Tertiary Carbonates (which are traditionally drilled riserless with seawater and sweeps), with no hydrocarbons or moveable water ever encountered, there is no risk of fluid discharge from the well over time<br><br><u>Social</u><br><br>The wellhead and guide base is within Zone 1 of the Pilbara Trawl Fishery (Section 7.1) which is currently closed to trawling (has been closed to trawling since 1998). Reopening of Zone 1 would involve a number of changes, including amendment to the Pilbara Fish Trawl Interim Managed Fishery Management Plan.<br><br>Corkybark-1 wellhead will be marked on nautical charts and communicated to marine users. In the unlikely event that Zone 1 is reopened, the extent of the area that may be avoided by trawl fishers is <0.015% of Zone 1.<br><br>The much larger, adjacent Pilbara Trawl Fishery Zone 2 will be unaffected, where currently 6,900 sq nm out of a total area of 14,980 sq nm remains open to trawl fishing.<br><br>The risk reducing potential of vessel automatic radar and nautical charts is considered high (Acona 2019), noting it has not had any adverse impacts on marine users over the past 20 years it has been on the seabed. Currently, only two vessels are active in the Pilbara Trawl Fishery (in Zone 2). Therefore, the risk of snagging and displacement of future trawling vessels, should Zone 1 reopen, is low.<br><br>Furthermore, in the short to medium-term (<250 years), the ongoing presence of the Corkybark-1 wellhead and guide base may benefit local fish populations with the structure providing a refuge for fish and hard substrate for marine growth. In the long term (>250 years), the wellhead is expected to fully degrade. | |

As presented in Table 3-6, the preferred option is to leave the wellhead and guide base in-situ.

The Offshore Petroleum Decommissioning Guideline (DISER, 2018) states that "options other than complete removal may be considered, however the titleholder must demonstrate that the alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared to complete removal, and that the approach complies with all other legislative and regulatory requirements". In summary, the leave in-situ option has been determined to deliver equal or better environmental, safety and well integrity outcomes compared to complete removal option, due to the following:

1. The complete removal case is a complex operation. A number of engineering solutions have been discussed in Table 3-6, these require dredging operations under the guide base and use of external cutting tools from an ROV close to the seabed. The activity may be problematic due to:

- The dredging activity requirement to get access to the wellhead externally
- The movement of the sand once the dredging has been performed, which could mean further dredging is required to gain access to the wellhead.
- Reduced visibility during the wellhead cutting activity, which could make cutting problematic

The leave in-situ option presents no technical risk.

2. The complete removal case is determined a higher environmental risk activity compared to the leave in-situ option. Table 3-6 presents a number of risks associated with complete removal, including those relating to the dredging requirements, ROV and vessel use.

   Low environmental impacts and risks have been identified relating to the leave in-situ option. The following have been discussed further in this EP:

- Future interaction of the wellhead and guide base with other users (e.g. trawling vessels) (Section 7.1)
- Release of metals from wellhead and guide base breakdown (Section 7.7)
- Seabed alteration from scour around the wellhead and guide base (Section 7.8)

A range of control measures have been evaluated within the above EP sections. Environmental impacts and risks from the leave in-situ option have been assessed as ALARP and acceptable.

3. The wellhead and guide base is within Zone 1 of the Pilbara Trawl Fishery (Section 7.1) which is currently closed to trawling (has been closed to trawling since 1998). In the event that Zone 1 is reopened to trawling, the risk reducing potential of vessel automatic radar and nautical charts is considered high, and given the scale of the area where trawlers may be excluded (<0.015% of Zone 1, if it were to reopen), the overall snag risk is considered low. In the rare event of snagging, the pulling force from snagged equipment is unlikely to be sufficient to cause the rollover of the stern trawlers, such as those used in the Pilbara Trawl Fishery, due to the forces acting on the length axis of the vessel (Ancona 2019). Thus any potential impacts

of snagging to the fishery would expected to be minor and short term, based on interruption to fishing operations and damage to individual trawl equipment. Furthermore, currently there are only two active trawl vessels in the Pilbara Trawl Fishery (operating in Zone 2), and trawl fishing efforts have been at historically low levels (Gaughan *et al.*, 2020).

4. The wellhead removal requires the use of a vessel (similar to that described in Section 3.10) and therefore has associated health and safety risks (with the potential to cause injury to personnel or fatalities). No health and safety risks were identified for the leave in-situ option.

The leave in-situ decommissioning option meets the requirements of Section 572(3) and Section 270(3)(c) of the OPGGS Act, which allows for considering alternatives when compared to complete removal. The leave in-situ option is also not inconsistent with the relevant principles of ecologically sustainable development (ESD). The equal or better environmental outcomes evaluation assess the activity against the relevant principles of ESD is presented in Table 3-7.

**Table 3-7: Assessment of the wellhead removal options against the principals of ESD**

| Principals of ESD | Assessment |
|---|---|
| Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations (the integration principle) | The Options Assessment process assessed the long-term and short-term, environmental and social aspects associated with leaving the wellhead in-situ (Table 3-6) |
| If there are threat of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the 'precautionary principle') | The Options Assessment determined that there is potentially a slight impact with leaving the wellheads in- situ (Table 3-6). There is no threat of serious or irreversible damage associated with leaving the infrastructure in-situ. There is no threat of serious of irreversible damage associated with complete removal of wellhead. |
| The principle of intergenerational equity- that the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (the 'intergenerational principle') | Removal of the wellhead removes any potential impact associated with long-term degradation of the wellheads or interference with other users.<br>There is no significant benefit of leaving the wellhead in-situ. It, however, does provide for a hard substrate habitat for fish assemblages (as detailed in Section 7.8) |
| The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making ('the biodiversity principle') | The introduction of a vessel and requirement for dredging for the removal of the wellhead or installation of an over-trawlable structure or rock dumping has the potential to cause more environmental risks and impacts, particularly over the short term, than leaving the wellheads in-situ as is (Table 3-6). |

### 3.5.2 Control Modules, Flowlines and Umbilicals and Manifolds

The WB1 control system is direct hydraulic. WB2, WB4 and SB1 wells were controlled using a multi-plexed production control system via electro-hydraulic Subsea Control Modules (SCM) located on the SB1 and WB4 manifolds.

The SCM includes control umbilicals which contain cores for hydraulic fluid, chemical injection and power and signal cores for control and data recovery from the wells HXT and down hole gauges. There are two umbilical baskets, one at SB1 and one at WB2A. These are skid structures where the end of the infield umbilical is terminated to a SUTU. UTAs are present at WB2A and WB4 wells. Table 3-8 to Table 3-11 details the flowlines, gas lift lines and umbilicals remaining in the field and the contents.

**Table 3-8: Six-inch flowlines remaining in the field**

| Description | Length (m) | Total Length (m) | Volume (m³) |
|---|---|---|---|
| 6" Flexible Jumper | 17 | 17 | 0.3 |
| 6" Flexible Flowline (SB1M to SB1) | 1,670 | 1670 | 30.5 |
| 6" Flexible Flowline (SB1M to WB4M) | 5,750 | 5750 | 104.9 |
| 6" Flexible Jumper (WB4M to WB4) | 50 | 50 | 0.9 |
| 6" Flexible riser, DSPM to SB1M | 1045 | 2090 | 38.1 |
| 6" Flexible riser, DSPM to WB1A | 1045 | 1045 | 19.1 |
| | **Total** | 10622 | 194 |

**Table 3-9: Four-inch gas lift lines remaining in the field**

| Description | Length (m) | Total Length (m) | Volume (m³) |
|---|---|---|---|
| 4" Flexible Flowline (SB1M to WB4M) | 5,750 | 5750 | 46.62 |
| 4" Flexible Jumper (WB4M to WB4) | 50 | 50 | 0.41 |
| | **Total** | 5800 | 47* |

*lift gas

**Table 3-10: Two-and-a-half-inch gas lift lines remaining in the field**

| Description | Length (m) | Total Length (m) | Volume (m³) |
|---|---|---|---|
| 2-1/2" Flexible Jumper | 21 | 21 | 0.07 |
| 2-1/2" Flexible Flowline (SB1M to SB1) | 1,670 | 1670 | 5.29 |
| 2-1/2" flexible riser, DSPM to SB1M | 1035 | 1035 | 3.28 |
| 2-1/2" flexible riser, DSPM to WB1A | 1035 | 1035 | 3.28 |
| | **Total** | 3761 | 11.91* |

*lift gas

**Table 3-11: Umbilicals remaining in the field**

| Description | Qty | Length (m) | Total Length (m) | CI lines – total volume (m³) | Spare lines – total volume (m³) | Hydraulic lines – total volume (m³) |
|---|---|---|---|---|---|---|
| EHU Jumper (SB1M to WB2A) | 1 | 22 | 22 | 0.00 | 0.00 | 0.01 |
| EHU Jumper (SB1M to SB1) | 1 | 5-10 | 10 | 0.00 | 0.00 | 0.00 |
| Infield EHU (SUTU to SUTU) | 1 | 1,670 | 1670 | 0.24 | 0.24 | 0.48 |
| EHU Jumper | 1 | 8 | 8 | 0.00 | 0.00 | 0.00 |
| Infield EHU (UTA1 to UTA2) | 1 | 5,750 | 5750 | 0.82 | 0.41 | 2.87 |
| WHU Jumper (WB4M to WB4) | 2 | 50 | 100 | 0.01 | 0.01 | 0.03 |
| Umbilical Jumper, UTA1 to SB1M | 3 | 50 | 150 | 0.02 | 0.02 | 0.04 |
| Umbilical Jumper, UTA2 to WB4M | 3 | 50 | 150 | 0.02 | 0.02 | 0.04 |
| EHU, FPSO to WB2/SB1 FPSO SUTU | 1 | 1075 | 1075 | 0.15 | 0.15 | 0.31 |
| EHU, DSPM to WB DSPM SUTU | 1 | 1075 | 1075 | 0.15 | 0.15 | 0.31 |
| | | **Total** | 8300 | 1.18 | 0.77 | 3.59 |

Control modules, flowlines, umbilicals, SUTU, UTA and manifolds are no longer operational, have been flushed, and remain on the seabed at ambient pressure. Lines were left with seawater treated with multi-function inhibitor (required to ensure integrity), Hydrosure O-3670R, at a concentration of approximately 850 ppm. Residual hydrocarbon concentrations were reduced to 30 ppm in all but the flowlines between WB4 manifold and SB1 manifold and WB4 and WB4 manifold. These flowlines were reduced to an oil in water content of 200 ppm.

During September 2020, following a failure of the mid-depth buoy tether system the 6 inch flowline at the DSPM was noted to have been damaged. The yellow outer sheathing and various sub-layers were breached, thus exposing the internal armour layer. The bend radius of the 6” flowline was found to be tight. The 2” gas lift line, the sharp edge of the stopper clamp was found to have gouged through the yellow outer sheathing at the underside of the 6” production line (Fugro 2020). A subsequent inspection in November 2020 found the umbilical line detached from the DSPM. The other end of the umbilical, which was attached to the MDB, which has since been disconnected. The Section of umbilical has been laid back onto the seabed and secured to seabed through grout bags.

The WB3A and WB5A wells were not producing wells, hence they have no control modules, umbilicals or manifolds. Only WHs remain on the seabed for these wells.

#### 3.5.2.1 Normally Occurring Radioactive Materials

NORMs were identified on the FPSO production equipment when it departed field.

Since then, a non-invasive survey was undertaken of flowlines in 2014, but could not confirm the presence of NORMs in the subsea equipment. Any NORMs in the flowlines is likely to be present as hard scale and during the cutting of the flowlines NORMs will not be discharged.

#### 3.5.2.2 Condition of Subsea Infrastructure

CP readings and ROV inspection of subsea infrastructure were undertaken in 2010, 2014, 2016 and most recently in 2020. The condition of various components is summarised below.

**Condition of the SB1 and WB4 Manifolds**

SB1 and WB4 manifolds were inspected in January 2020 by Bhagwan Marine. Corner padeyes on manifold observed to be in good condition and no observable corrosion. Light soft marine growth is observed on the structures (Figure 3-9 and Figure 3-10) (Bhagwan Marine 2020).


**Figure 3-9: SB1 manifold roof padeye**


**Figure 3-10: WB4 manifold NW roof padeye**

### Condition of the SB1 Subsea Umbilical Termination Unit

SB1 SUTU was inspected in January 2020. Corner padeyes observed to be in good condition. Light soft marine growth observed with 90% coverage. Some SUTU frame base in burial has occurred (Figure 3-11) (Bhagwan Marine, 2020).


**Figure 3-11: SB1 SUTU in burial**

## Condition of the WB2A and WB4 Umbilical Termination Assembly

WB2A and WB4 UTA were inspected in January 2020. WB2A and WB4 UTA lifting swing arm on structure appear to have good integrity. Padeyes on main bodies of the UTAs were observed to be in good condition with signs of corrosion or damage to arms to lifting eyes. Pivot points appear to be in good condition on both UTAs. WB2A and WB4 UTA images are provided in Figure 3-12 and Figure 3-13 respectively (Bhagwan Marine, 2020).


**Figure 3-12: WB2A UTA lifting arm**


**Figure 3-13: WB4 UTA lifting arm**

### 3.5.3 Disconnectable Single Point Mooring Buoy

The FPSO was disconnected from the DSPM buoy, which was lowered to an approximate water depth of 35 m prior to the FPSO departing the field in 2012.

The DSPM is made up of three primary components, the main body, the fender and the sponson (Table 3-12). The DSPM buoy is shown in Figure 3-14 with the main body marked in red and the sponson in blue.

**Table 3-12: Key DSPM components**

| Component | Description |
|---|---|
| Main Body | The main body of the buoy is the cylinder marked in red in Figure 3-14. There are nine levels in the main body, each of which is sub-divided into four compartments. |
| Sponson | The area marked in blue in Figure 3-14 shows the sponson. The sponson is a donut shaped body that sits around the main body at the bottom of the DSPM buoy and is divided into six equally sized watertight compartments. |
| Fender | The fender sits at the top of the DSPM buoy and was used to prevent damage to the DSPM during pull-in into the FPSO. |
| Mooring System | The DSPM buoy is moored by six mooring legs. The anchors are located at a horizontal distance of 779.9 m from the centre of the buoy. Each leg has a total length of 802 m.<br>The DSPM buoy will be removed in accordance with Sections 3.4.3 and 3.8.<br>The mooring chains and anchors are not removed under this EP and are subject to a separate decommissioning scope and EP submission (refer Section 3.4.4). |

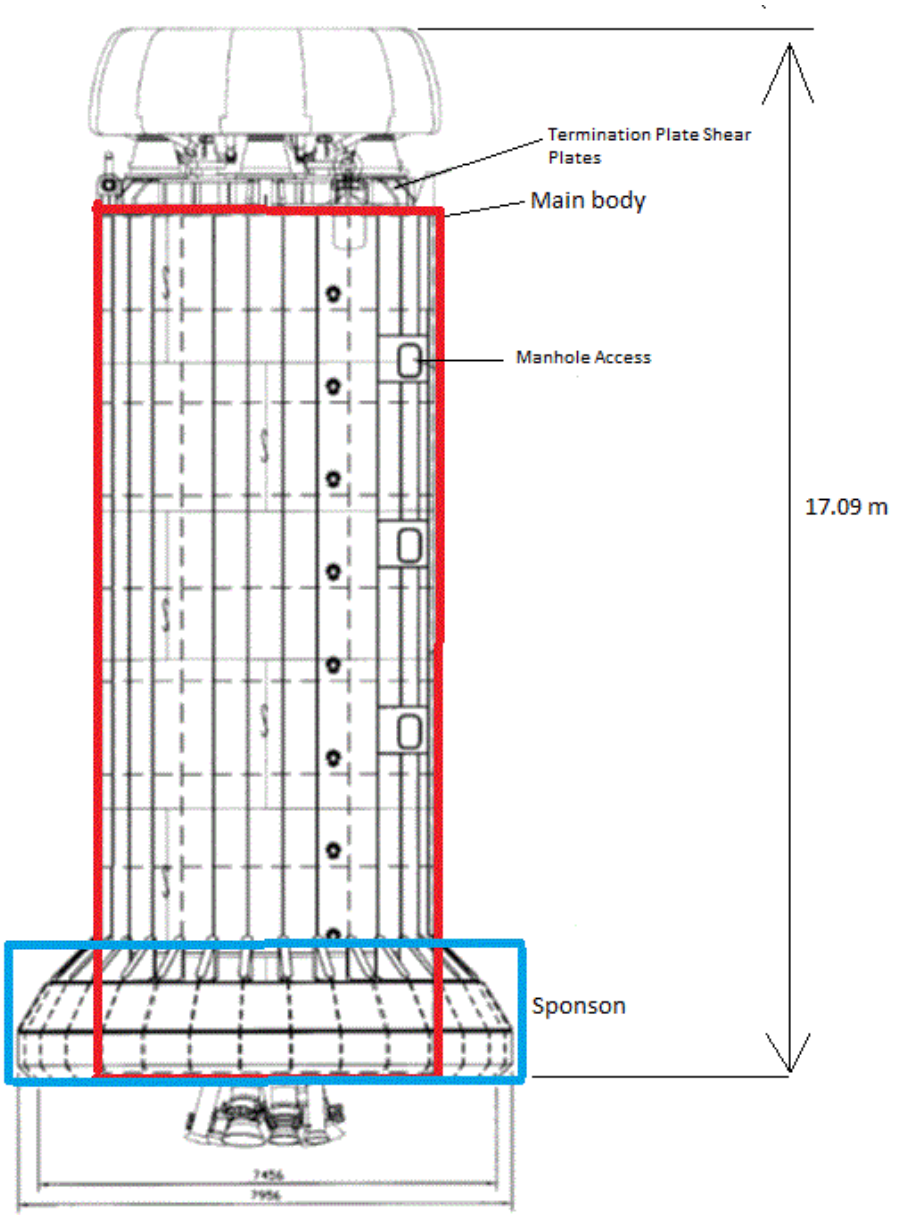



**Figure 3-14: Woollybutt DSPM buoy with marked main body and sponson**

The main dimensions and properties of the DSPM buoy are presented in Table 3-13.

**Table 3-13: Key DSPM information**

| Parameter | Unit | Value |
|---|---|---|
| Height | m | 17.09 |
| Mass [1] | t | 275.95 |
| Diameter – main body | m | 5.45 |
| Diameter – sponson | m | 7.96 |
| Watertight air volume – main body | m³ | 302.11 |
| Watertight air volume – sponson | m³ | 36.47 |

1. The mass of the buoy includes clump weights added to the buoy.

#### 3.5.3.1 Condition of the DSPM Buoy

The DSPM buoy was surveyed in 2010, 2012, 2016 and 2020.

Table 3-14 details the current location and status of the DSPM, as per the September 2020 survey.

**Table 3-14: Current location and status summary of the DSPM**

| Infrastructure | Latitude | Longitude | Status Summary |
|---|---|---|---|
| DSPM | S 20 ° 54’35.96” | E 114 ° 54’26.45” | The DSPM is currently located on the seabed, l within the 500 m PSZ. |

The condition of the components noted in the 2020 survey of the DSPM are described in Table 3-15.

**Table 3-15: DSPM component status and condition, as noted in the 2020 survey (Bhagwan Marine, 2020)**

| Component | DSPM status and condition |
|---|---|
| Risers and umbilicals | The exact position of the risers and umbilicals and the length suspended off the seabed was difficult to determine; however, it appeared that the risers and umbilicals curved around under the DSPM (Figure 3-15). |
| Mooring chains | The chains were seen hanging down from the buoy to the seabed as presented in Figure 3-16.<br>The chains at approximately the 11 and 1 o’clock positions had fallen in amongst the risers, though tangling appeared low due to the high stiffness of the risers. Accessibility to the chains was good for those along the upper edge of the as fallen position; however, interference with the risers may hamper access to the lower chains. |
| Body of buoy | The body of the buoy was generally in good condition, with minimal corrosion evident and no observed deformation due to external pressure.<br>Three of the seven manholes were visually inspected, with the four manholes not observed assumed to be underneath the buoy. Corrosion was evident at the lower external manhole cover, with preferential corrosion of the weld fill material observable in the 2020 inspection video (Figure 3-17). The condition of the four manholes that were not been inspected in the 2020 survey is unknown. |
| Lifting lugs | Two DSPM padeyes were cleaned and were observed to be in good condition.<br>Inspection of the top of the DSPM showed that the fender and lifting lugs were in good condition with no observed corrosion (Figure 3-18). Two of the three lugs were accessible in the as fallen position (approximately in the 11 o’clock and 3 o’clock positions). |


**Figure 3-15: WA1 risers as-found**


**Figure 3-16: DSPM mooring chains**

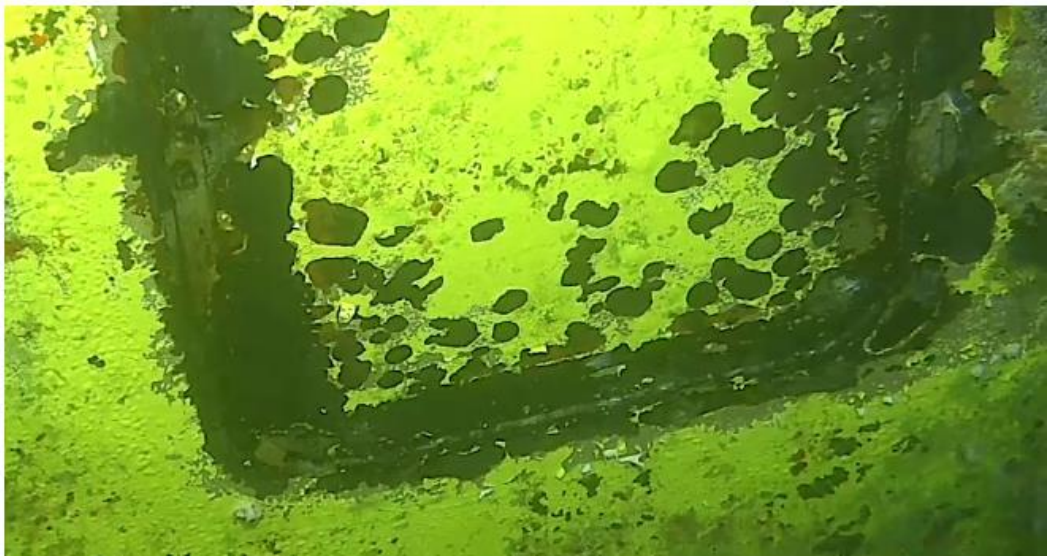


**Figure 3-17: Lower manhole cover corrosion**


**Figure 3-18: DSPM lifting lugs – Top 11 o'clock position, bottom 3 o'clock position as fallen**

**Maintaining DSPM Condition**

Eni have undertaken a number of assessments to ensure compliance with Section 572(2)) OPGGS Act, to 'maintain in good condition and repair all structures that are, and all equipment and other property that is, in the title area and used in connection with the operations'.

The following have been undertaken with respect to the DSPM:

- DSPM stability assessment – to ensure that the estimated DSPM stability is in accordance with DNVGL-RP-F109 On-bottom stability design of submarine pipelines.
- Storm Loading Assessment – to assess the impact of increased environmental loading on the stability of the DSPM and ensure that the DSPM single mooring line can now withstand loads from a 100 year return period cyclonic event.
- Ongoing weather monitoring - to ensure the environmental loads at the site location do not exceed the submerged DSPM load limit (estimated as exceeding the 100 year return period)

### 3.5.4 Mid-Depth Buoy System

Each mid-depth buoy system consists of a gravity base, tether system (including tri-plate and shackle and connection plate) and a mid-water arch with a buoyancy tank. Figure 3-19 shows the gravity base in orange, one of the two tethers in green and the mid-water arch with buoyancy tank in blue.

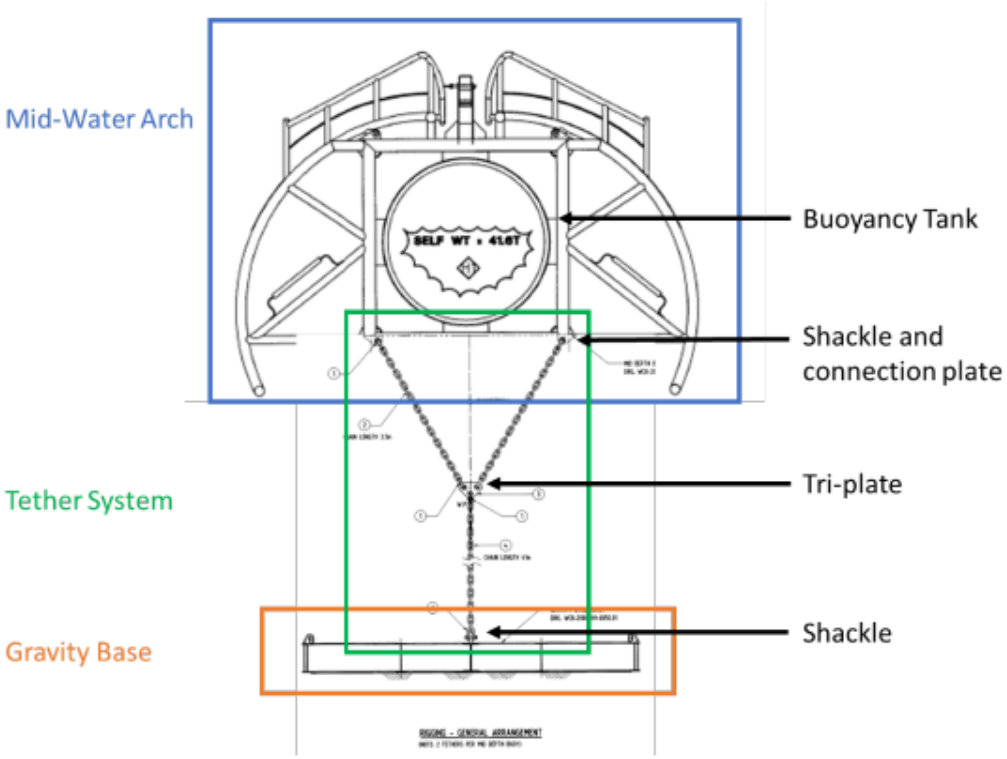



**Figure 3-19: Mid-depth buoy system**

In August 2020, the north mid-depth buoy was noted to have risen to the sea surface from its previous location at 50 m water depth, due to tether failure. Subsequently both north and south mid-depth buoys/arch were removed from the field and taken to shore for disposal in November 2020.

The components of the mid-depth buoy system that remain in the field are:

- gravity bases
- tether system.

Each of the two mid-depth buoy gravity bases weigh 105 t. The gravity bases are constructed of steel and concrete with dimensions of approximately 7 m by 10 m. They are coated with a standard epoxy paint, optimised for marine use. The structures remain protected by two anodes.

#### 3.5.4.1 Condition of the Gravity Base

North and south mid-depth buoy systems were inspected in January 2020.

**Gravity Bases**

No significant corrosion has been observed on either gravity base (Atteris, 2020). CP readings were taken on the gravity base frames in the 2020 survey (Bhagwan Marine, 2020), all showing the structures were still protected as per DNVGL-RP-B401 (Det Norske Veritas Germanischer Lloyd, 2017). Both gravity bases are believed to be currently adequately protected and have anode material remaining (Atteris, 2020).

Approximately 100 mm of scour was observed on the north, south and west sides of the south mid-depth buoy gravity base (Figure 3-20). Padeyes on the both north and south mid-depth buoys gravity bases appeared to be in good condition with clear access (Figure 3-21 and Figure 3-22).


**Figure 3-20: South gravity base scour on north side**


**Figure 3-21: North MDB gravity base padeye**


**Figure 3-22: South MDB gravity base padeye**

## 3.6 Field Management Activities

Field management activities that may be undertaken in accordance with this EP include:

- CP surveys (Section 3.6.1)
- GVI (Section 3.6.2)
- inspection, monitoring, maintenance and repair, such as installation of supplementary anodes (Section 3.6.3)
- retrieval, cleaning and re-run of debris tree caps (Section 3.6.4).

These are undertaken using ROVs, deployed from a vessel. Field management activities will be undertaken in accordance with the Woollybutt IMP (20-061-PL-001), which includes:

- scope of equipment/subsea infrastructure covered
- General Anomaly Acceptance Criteria (including CP acceptance)
- IMP methodology
- monitoring and maintenance philosophies applied
- subsea equipment inspection frequencies and intervals based on risk.

The subsea infrastructure included in the Woollybutt IMP (20-061-PL-001) are:

- HXTs
- Manifolds
- UTAs
- SUTUs
- DSPM
- mid-depth gravity bases
- umbilicals and flowlines.

CP and GVI have been used to evaluate the infrastructure integrity at all of the Woollybutt production wells and subsea infrastructure within WA-25-L.

### 3.6.1 Cathodic Protection

CP is undertaken in accordance with the Woollybutt Integrity Management Plan (IMP) (20-061-PL-001) and typically includes:

- visual inspection of anode consumption, dimensions, continuity cables, degree of marine fouling, evidence of coating damage and evidence of corrosion damage
- a voltage potential survey to measure the CP in place for subsea infrastructure. This is done with a voltmeter by direct contact with the steel via a CP stabbing probe and a reference electrode located adjacent to the steel surface.

Where required, marine growth may be removed using a brush or high pressure water jet, and acid (applied with high-pressure hose). The application of acid would be minimal and cleaning mostly conducted by brush.

The asset integrity Woollybutt infrastructure will be managed in accordance with Integrity Management of Submarine Production Systems, DNVGL Doc. No. DNVGL-RP-0002, Sept 2019, as outlined in the Woollybutt IMP (20-061-PL-001). Deviation from the standards may only occur in instances which integrity of infrastructure can be proven, through engineering assessments to meet Section 572(2)) OPGGS Act, to 'maintain in good condition and repair all structures that are, and all equipment and other property that is, in the title area and used in connection with the operations'.

### 3.6.2 General Visual Inspection

GVI is undertaken in accordance with the Woollybutt IMP (20-061-PL-001) and typically includes inspections to determine:

- presence of leaks or bubbles using multibeam echo sounder (MBES) from an ROV
- general physical condition of all equipment
- evidence of mechanical damage and/or disturbance
- evidence of damage to external polymer sheaths
- evidence of scour, particularly around structure foundations
- evidence of debris or foreign objects
- evidence of anchor scars or other third-party interference
- marine growth coverage, type and thickness
- integrity of connections and/or tie-ins:
  - connections between chains and structures
  - tie-ins between flowlines, risers and umbilicals to trees or structures.

The GVI and CP methods used by Eni are well understood and do not represent any novel techniques or equipment. Typically, the techniques use an ROV deployed from a vessel. The frequencies and durations of field management activities are detailed in Section 3.4.1.

### 3.6.3 Inspection, Monitoring, Maintenance and Repair

Inspection, monitoring, maintenance and repair includes measurement of equipment (e.g. chain diameters) and anode installation.

Anode installation will involve using an ROV to clean a small part of the infrastructure component to remove marine growth, using brush or high-pressure water jet and acid (applied with high-pressure hose). Supplementary anodes will then be clamped on. The application of acid would be minimal and cleaning mostly conducted by brush.

### 3.6.4 Tree Cleaning

Subsea tree cleaning is planned to be performed several months before the well P&A campaign, to prepare and check all critical interfaces and mitigate the risk of having problems with the high cost well P&A spread. The subsea tree cleaning activity will utilise a vessel deployed ROV and involve the following:

- Retrieve overtrawlable tree cap to surface:
  - In case of any problem in retrieving tree caps and after trying various procedures for the retrieval, calcite wash may be injected with ROV wand under cap to overcome any calcite build-up.
- Clean marine growth off the tree cap at surface on the vessel deck using high pressure seawater or mechanical brush with discharge overboard.

- Inspect HXT top hub connector and clean as required with mechanical brushes.
- Run and install a temporary lightweight debris cap on the HXT with biocide and oxygen scavenger bag/stick taped within.
- Clean ROV interface panel, HFL MQC plates and EFL receptacles with high-pressure seawater or mechanical brush.
- Use custom plugs/shrouds to pump calcite wash to dissolve calcareous deposits in valve buckets and around actuator rod interfaces.
- Generally clean other parts of the tree such as guide post interfaces, slope indicators, flowline flanges and others by pressure wash, mechanical brush or calcite wash soaking.
- Although unlikely, light dredging of accumulated sediment mounds around the guidebase may be required for access and inspection.

## 3.7 Plug & Abandonment Activities

P&A activities are expected to be conducted from an Intervention Vessel (IV) or Mobile Offshore Drilling Unit (MODU). Allowance for IV or MODU use has been included to allow operational flexibility to conduct P&A in accordance with the schedule (Section 3.4). A maximum of three activity support vessels would support the P&A activities. An overview of the proposed P&A activity is provided in Table 3-16.

**Table 3-16: P&A activity overview**

| Item | Description |
|---|---|
| Permit Area | WA-25-L |
| Water Depth | 100 m |
| Number of Wells to be P&A | 4 to 6 |
| Vessel/MODU Type | IV/MODU |
| Support Vessels | 1 to 3 |

Typical P&A methodology is described in Section 3.7.1.

P&A activities may not necessarily be 100% completed on each well in series. The IV/MODU may move between wells for reasons of operational efficiency or troubleshooting.

### 3.7.1 Plug & Abandonment Procedure

Eni plans to undertake the P&A activities via an optimised abandonment strategy with the main objective of restoring the reservoir seal in the form of primary and secondary Well Barrier Elements (WBE) placed across competent rock above the reservoir. The WBE along with cement in the annulus and competent adjacent formation act as a uniaxial seal. The barrier philosophy and well integrity management will be designed, implemented and verified in compliance with the approved WOMP (000105_DV_PR.D&C.1028.000).

During P&A the HXT will be unlatched from the WH by disengaging the connector between the HXT and the WH using ROV or IWOCS. WH of suspended wells will be

severed internally using abrasion or mechanical cutting techniques. The WH and all the casing strings landed in the WH will be severed in one operation and will be retrieved at once.

#### 3.7.1.1 Wellhead Recovery

The WH and HXT recovery will be optimised based on technical considerations and vessel constraints. Therefore, WHs of suspended wells may be severed and recovered directly after P&A from the IV/MODU or with a different vessel (e.g. a multipurpose vessel or MPSV), similar to an IV described in Section 3.10.2, also within the execution window described in Section 3.4.3. The wellhead recovery method is detailed in Section 3.8.2.

#### 3.7.1.2 Plug & Abandonment Cementing Discharges

Cementing operations are planned to be undertaken to abandon selected wells. During cement unit testing, commissioning and cleaning operations cement (as a slurry) would be discharged to sea surface from the cement discharge line. Such discharge events would be typically less than 6 m³ and be performed on arrival at the P&A location.

A similar volume of up to 6 m³ could be discharged to the sea surface in the unlikely event a downhole cementing operation is aborted due to operational issues and the cement is circulated out of the well and overboard.

Although structural studies do not indicate any issues, in the event unexpected WH/conductor movement is observed, cement may be pumped around the subsea WH as a contingency to ensure structural integrity was achieved. A discharge of 5 m³ per well could occur.

In the event a downhole cement plug was required to be drilled out, the hard cement debris would be discharged overboard to the sea surface and would be up to 6 m³.

Excess dry bulk cement which is surplus to requirements of a P&A well would be retained and used on the next P&A well. At the end of the P&A campaign it would either be provided to the next operator or discharged to the marine environment.

All cementing chemicals will be selected in accordance with the chemical assessment process described in Section 3.9.

#### 3.7.1.3 Plug & Abandonment Fluids

P&A chemicals will be required to make kill fluid or cement slurry in order to place the permanent barriers. The use of additives for the brine would be minimal, as the fluid need only provide the hydrostatic column in order to hold off the reservoir fluid from coming to surface. In addition, low volumes of high viscosity water-based mud (WBM) (up to 50 m³) will be used per well to clean the hole or spot on bottom to support the placement of cement slurry.

A maximum of 50 m³ brine, which includes chemicals, may be discharged per well. Effort will be made to leave all the brine/cement and high viscosity pills downhole.

All P&A chemicals will be selected in accordance with the chemical assessment process described in Section 3.9.

#### 3.7.1.4 Well Fluids and Gases

Production wells will have residual hydrocarbons in the well. The operation is planned in such a way that fluids in the well will be pushed back to the reservoir, hence minimising surface handling requirements. A gas and fluids handling system will be used to take to the surface any fluids circulated from the well or flushed from a lubricator. It will separate and divert any residual gas in the well to a safe venting location onboard the vessel and route remaining dirty water/sludge to an onboard filtration package.

The gas in the annulus will be circulated or lubricated back to the surface and will be vented from a dedicated surface bleed-off package on the IV/MODU. It is expected that the total volume of gas brought to surface on each well would be approximately 1,550 $ft^3$.

Although low probability, there could be a circumstance whereby the gas lift in the A annulus has leaked into the B annulus and accumulated a larger inventory of gas. In this circumstance the volume of gas to be vented could be significantly more than what would otherwise just be in the A annulus.

#### 3.7.1.5 Oily Water

It is not possible to bullhead 100% of the hydrocarbons from the tubing back into the reservoir (as there is no way of attaching the vessel to the flowlines). This will result in an oily residue in the circulated brine, some of which will be released into open water when entering the well.

Concentration of oily water discharged from vessels will be ≤15 ppm in accordance with Marine Order 91 (Marine pollution prevention-oils).

#### 3.7.1.6 Hydraulic Control Fluids

The well control equipment (WCE) is required to be regularly functioned and function tested when on the well, as defined by legislative and Company's requirements. The WCE is also function tested during assembly and maintenance. As part of the testing process, when subsea, small volumes of hydraulic control fluid (generally consisting of water mixed with a glycol-based detergent or equivalent water based anti-corrosive additive) is released to the marine environment. The hydraulic control fluid used for the operation of the WCE rams is likely to be similar to StackMagic (commercial name), which is fully biodegradable. Approximately 300 to 350 litres of the base chemical diluted in water (at 2% maximum) may be discharged to the marine environment during a typical subsea well abandonment.

## 3.8 Subsea Equipment Recovery

Subsea equipment will be recovered using the multipurpose support vessels (MPSV). The equipment proposed to be recovered from the field and taken to shore for disposal, recycling or reuse, in accordance with applicable legislation, are:

- disconnectable single point mooring (Section 3.8.1)
- subsea structures (including manifolds, umbilical termination assemblies and flying leads between equipment) (Section 3.8.2)
- mid-depth tether and gravity riser base (Section 3.8.3)
- the following wellheads and guide bases (as detailed in Table 3-3 and Appendix B) (9 in total)
    - SB1
    - WB4,
    - WB2A
    - WB2
    - WB1H
    - WB3A
    - WB5A
    - WB5
    - WB6H

Subsea equipment recovery comprises:

- surveying all seabed equipment in the Woollybutt field using ROV and high pressure water jetting to expose and clean lift points and cutting sites
- disconnecting flowlines, umbilicals, chains and other structures using a subsea hydraulic shear cutter, super grinder or multi cutter
- retrieving equipment from the seabed using a combination of engineered recovery beam or rigging or subsea pipe baskets or grabs.

In the event that any of the above components cannot be retrieved in a safe manner, the component/s may be wet-stored on the seabed until decommissioning activities, subject to a future decommissioning EP submission (Section 3.4.4).

The equipment that will remain in the Woollybutt field and will be subject to future decommissioning (Section 3.4.4) under a separate EP are:

- flowlines and umbilicals ranging from 2½” to 6” in diameter, approximately 20 km in total length
- DSPM chains and anchors
- EHU and jumpers
- EHU crossing mattresses.

A detailed inventory of the Woollybutt field infrastructure and wellheads and decommissioning schedule is included in Appendix B.

### 3.8.1 Recovery of Disconnectable Single Point Mooring

The DSPM is currently lying on the seabed and is expected to remain on the seabed, in an upright position, once all product lines and mooring chains are disconnected (Figure 3-23). Mooring chains and anchors will remain on the seabed and be subject to a future decommissioning program.

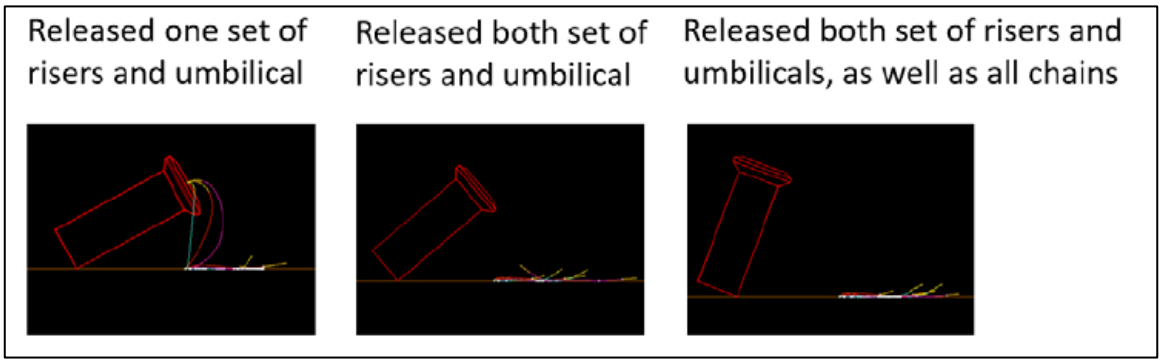



**Figure 3-23: DSPM position during disconnection**

To recover the DSPM, additional buoyancy may be used to safety float the DSPM to surface, such as buoyancy bag devices or a controlled variable buoyancy system.

Once at the sea surface, the two possible methods to transport the DSPM to shore are:

1. recovered to a vessel, or
2. surface-towed to shore using a bespoke towing bridal and tugboat.

Further engineering will be undertaken to confirm the type of buoyancy required and to design the transport method. This includes any steps for ROV to cut holes into the submerged DSPM in order to remove any residual buoyancy by flooding, prior to recovery.

Once the DSPM arrives onshore, it will be prepared for disposal, recycling or reuse in accordance with applicable legislation. DSPM mooring chains and anchors will remain in the field and be subject to later decommissioning (see Section 3.4.4).

Flowlines, umbilicals and mooring chains will be cut using a subsea hydraulic shear cutter, super grinder or multi cutter during the recovery of the DSPM. Following disconnection, umbilicals and flowlines will be left uncapped. The contents of the umbilicals and flowlines may be discharged (see Section 3.5.2 for contents).

### 3.8.2 Recovery of Subsea Structures and Wellheads

Appendix B includes subsea structures and wellheads planned to be recovered.

The recovery methodology will be engineered using existing lifting points and a contingency plan will be developed in the event an alternative method is required.

The following describes the proposed steps for the recovery of subsea structures:

- Perform high pressure water jetting to expose all lift points.
- Deploy crane coupled with bespoke engineered recovery beam, rigging, bespoke recovery basket and/or grabs (Figure 3-24).
- ROV will be used to attach rigging to individual lift points.
- Recover equipment individually to deck and into deck corral.
- Transport to shore for disposal in accordance with applicable legislation.

**Figure 3-24: Bespoke recovery basket (left) and grab (right)**

### 3.8.3 Recover Mid Water Arch and Riser Base

The components of the mid water arch and riser base that will be recovered are:

- two mid-depth buoy chains/tethers or remainder thereof as these are intended to have been fully recovered along with the MDB (<2 t each)
- two mid-depth buoy gravity bases (105 t each).

Note: the north and south mid-depth buoys have been removed from the field.

The recovery methodology will be engineered using existing lifting points and a contingency plan will be developed in the event an alternative method is required.

The mid water arch components will be recovered after cuts have been made to all connecting spools and jumpers. The following describes the proposed steps for the recovery:

- Redeploy crane with gravity base recovery rigging to depth.
- Relocate sediment using an ROV-mounted suction pump/dredging unit around the gravity base perimeter structure to aid recovery.
- Have the ROV connect crane rigging to gravity base lifting pad-eyes.
- Recover crane to surface and position gravity base on deck.
- Deploy subsea recovery basket to seabed for chain recovery. Disconnect crane.
- Hook up crane to first anchor chain, lift anchor chain until second end free from seabed.

- Slew crane to position chain over subsea basket, lower chain into subsea basket and disconnect crane.
- Recover subsea baskets c/w chain to deck and secure.

### 3.8.4 Marine Growth Removal

Marine growth from recovered subsea infrastructure may be removed on the vessel deck using high-pressure water and brushes. Removed marine growth will be discharged to the marine environment from the deck.

### 3.8.5 Sediment Relocation

If sediment has built up around subsea infrastructure and impedes the removal of the subsea equipment, an ROV-mounted suction pump may be used to move small amounts of sediment around its immediate vicinity, to allow safe recovery or inspection activities to be performed.

### 3.8.6 Wet-Park of Subsea Infrastructure

In the event of issues during removal of subsea infrastructure, the wet-parking of infrastructure on the seabed may be required for a period whilst the issue is resolved. Wet-parking will occur in close proximity of the infrastructures original location.

## 3.9 Assessment of Fluids and Chemicals

### 3.9.1 Chemical Assessment Process

All chemicals to be used in Woollybutt activities are considered within the scope of this chemical assessment and selection process. These include all downhole operational chemicals to be used during P&A (cement and water-based mud) and those to be used in field management (acids). Chemicals required for maintenance activities (e.g. paints, lubricants and greases), potable water treatment chemicals, emergency response chemicals and those chemicals used for domestic purposes are considered out of scope. The scope follows the same principles as applied in the UK under the Offshore Chemical Regulations 2002 (as Amended 2011).

### 3.9.2 Assessment Process

This assessment process requires chemicals to be selected with the lowest practicable environmental impacts and risks subject to technical constraints.

#### CEFAS OCNS Registered Chemicals

All chemicals which are registered on the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Offshore Chemical Notification Scheme (OCNS) list with assigned Hazard Quotients (HQs) Bands of gold or silver, or OCNS Groups E or D and have no substitution (SUB) warnings or product warnings are determined to not require further assessment, as they do not present an environmental impact in standard discharge scenarios. These chemicals are considered approved for use/discharge for the Woollybutt activities.

CEFAS OCNS registered chemicals which have a SUB warning, product warning or have HQ Bands of white, blue, orange, purple or OCNS Groups of A, B or C require ALARP assessment by the Eni HSE Team to understand the environment risk of the use/discharge into the marine environment. The Eni HSE Team may either reject or approve once an ALARP assessment is documented and signed off showing that the environmental risk from the use/discharge is acceptable.

**Non-CEFAS OCNS Registered Chemicals**

All chemicals proposed for use that are not on the CEFAS OCNS register require ALARP assessment by the Eni HSE Team to understand the environment impacts of the use and discharge to the marine environment.

**ALARP Chemical Assessment and Justification for Use/Discharge**

CEFAS OCNS registered chemicals which have a SUB warning, a product warning or have HQ Bands of white, blue, orange, purple or OCNS Groups of A, B or C and any chemical which is not registered under the CEFAS OCNS require further assessment by Eni HSE Team in accordance with the principles of ALARP. This assessment includes:

- Assess the chemicals application and discharge.
- Assess the ecotoxicity, biodegradation and bioaccumulation potential of the chemical in the marine environment and any other applicable environmental information available (see below). High biodegradation and low ecotoxicity values are preferable.
- Investigate potential alternatives for the chemical, with preference for an alternative option that is on the OCNS Ranked List of Notified Chemicals with OCNS Hazard Quotient of Gold, Silver, or are Group E or D with no substitution or product warning and/or chemicals with low eco-toxicity (Section 3.9.3), readily biodegradable (Section 3.9.4) and do not bioaccumulate (Section 3.9.5).
- If no more environmentally suitable alternatives are available, further risk reduction measures (e.g. controls related to use and discharge) are considered for the specific context and implemented where relevant to ensure the risk is ALARP and acceptable:
- Justify the selected chemical, in respect to others available.
- Apply further risk reduction measures i.e. specific controls on its use or future recommendations.
- Obtain concurrence/sign off by the relevant environment team lead that the environmental risk associated with the chemical use/discharge is ALARP and acceptable.

The above is included and documented in the HSE Standard: Hazardous Materials Management (ENI-HSE-ST-009).

### 3.9.3 Ecotoxicity Assessment

Table 3-17 and Table 3-18 can act as guidance in assessing a chemicals toxicity. Table 3-17 is used by CEFAS to group chemical based on ecotoxicity results, 'A'

representing highest toxicity/risk to environment and 'E' lowest. Table 3-18 shows classifications/categories of toxicity against ecotoxicity results.

**Table 3-17: Initial CEFAS OCNS grouping**

| Initial grouping | A | B | C | D | E |
|---|---|---|---|---|---|
| Result for aquatic-toxicity data (ppm) | <1 | > 1-10 | > 10-100 | > 100-1,000 | > 1,000 |
| Result for sediment-toxicity data (ppm) | <10 | > 10-100 | > 100-1,000 | > 1,000-10,000 | > 10,000 |

Note: Aquatic toxicity refers to the *Skeletonema costatum* EC50, *Acartia tonsa* LC50, and *Scophthalmus maximus* (juvenile turbot) LC50 toxicity tests. Source: DMP 2013, Environmental Risk Assessment of Chemicals Used in WA Petroleum Activities Guideline

**Table 3-18: Aquatic species toxicity grouping**

| Category | Species | LC50 and EC50 criteria |
|---|---|---|
| Very Toxic | Fish | LC50 (96hr) of < 1 mg/l |
| | Crustacea | EC50 (48hr) of < 1 mg/l |
| | Algae/other aquatic species | ErC50 (72 or 96hr) of 1 mg/l |
| Toxic | Fish | LC50 (96hr) of > 1 mg/l to > 10mg/l |
| | Crustacea | EC50 (48hr) of > 1 mg/l to < 10 mg/l |
| | Algae/other aquatic species | ErC50 (72 or 96hr) of 1 mg/l to < 10 mg/l |
| Harmful | Fish | LC50 (96hr) of < 10 mg/l to < 100 mg/l |
| | Crustacea | EC50 (48hr) of < 10 mg/l to < 100 mg/l |
| | Algae/other aquatic species | ErC50 (72 or 96hr) of < 10 mg/l to < 100 mg/l |

Source: DMP 2013, Environmental Risk Assessment of Chemicals Used in WA Petroleum Activities Guideline

If a product has no specific ecotoxicity data available, then the following options should be considered:

- Ecotoxicity data for analogous products can be referred to where the chemical ingredients and composition are largely identical (e.g. Portland Cement is produced by different manufacturers with some having minor variations in content, ecotoxicity from a variation product may be used with careful consideration).
- Ecotoxicity data may be referenced for each separate chemical ingredient (if known) within the product.

### 3.9.4 Biodegradation Assessment

The biodegradation of chemicals is assessed using the CEFAS biodegradation criteria, which aligns with the categorisation outlined in the DMP Chemical Assessment Guide: *Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline.*

- CEFAS categorises biodegradation into the following groups:

- Readily biodegradable: results of > 60% biodegradation in 28 days to an OSPAR harmonised offshore chemical notification format (HOCNF) accepted ready biodegradation protocol.
- Inherently biodegradable: results > 20% and <60% to an OSPAR HOCNF accepted ready biodegradation protocol or result of > 20% by OSPAR accepted inherent biodegradation study.
- Not biodegradable: results from OSPAR HOCNF accepted biodegradation protocol or inherent biodegradation protocol are < 20%, or half-life values derived from aquatic simulation test indicate persistence.

Chemicals with > 60% biodegradation in 28 days to an OSPAR HOCNF accepted ready biodegradation protocol are considered acceptable in terms of biodegradation.

### 3.9.5 Bioaccumulation Assessment

The bioaccumulation of chemicals is assessed using the CEFAS bioaccumulation criteria, which aligns with the categorisation outlined in the DMP Chemical Assessment Guide*: Environmental Risk Assessment of Chemicals used in WA Petroleum Activities Guideline* (2013).

The following guidance is used by CEFAS:

- Non-bioaccumulative: LogPow < 3, or BCF ≤ 100 and molecular weight is ≥ 700.
- Bioaccumulative: LogPow ≥ 3 or BC > 100 and molecular weight is < 700.

### 3.9.6 Review of ALARP Chemical Assessments and Ongoing Assessments

Chemical assessments and ALARP documents for individual chemicals are valid for individual campaigns (e.g. the P&A campaign) or activities. Should any of the chemicals be required for subsequent campaigns or activities then the chemical assessment process is re-done. ALARP chemical justifications may be signed off for subsequent campaigns or activities after a check against the activity they are approved for and a check of the currency of information against the CEFAS OCNS list.

## 3.10 Intervention Vessel, Support Vessels and MODU

### 3.10.1 Support Vessels

Support vessels will be selected based on the activity that will be undertaken. Typically only one vessel will be in the Operational Area at any one time undertaking field management. A maximum of three support vessels will be utilised to support the IV/ MODU during P&A activities and recovery of subsea equipment.

All vessels will be commercial vessels with a suitable survey class for activities in the Operational Area. The vessels will run on marine diesel; no intermediate or heavy fuel oils will be used. Vessel specifications for supporting P&A and equipment recovery activities are provided in Table 3-19 and Table 3-20, respectively.

**Table 3-19: Typical P&A support vessel details**

| Parameter | Description |
|---|---|
| Draft (max) | 3.25 m (max) |
| Length | 56.8 m |
| Gross tonnage | 1475 Gt |
| Hull | Steel hull |
| Fuel type | Marine diesel |
| Total fuel volume | 138.2 m³ |
| Volume of largest fuel tank | 30.4 m³ |

**Table 3-20: Typical equipment recovery multipurpose support vessel details**

| Parameter | Description |
|---|---|
| Draft (max) | 6-8 m |
| Length | 85 to 130 m |
| Berths | 100 persons |
| Gross tonnage | 4000-13000 Gt |
| Fuel type | Marine diesel |
| Total fuel volume | 2000-2500 m³ |
| Volume of largest fuel tank | 250 m³ |

### 3.10.2 Intervention Vessel

An IV or MODU will be used to conduct P&A and equipment recovery activities (see Section 3.7). Allowance for IV or MODU use has been included to allow operational flexibility to conduct P&A in accordance with the schedule (Section 3.4).

Specifications of a typical IV are provided in Table 3-21.

**Table 3-21: Typical IV details**

| Parameter | Description |
|---|---|
| Draft | 9 m (transit)<br>18.25 m (operating) |
| Length | 110 to 130 m |
| Berths | 100 persons |
| Gross tonnage (International) | 22,725 GRT |
| Hull | Steel hull |
| Fuel type | Marine diesel |
| Total fuel volume | 1800 $m^3$ |
| Volume of largest fuel tank | 490 $m^3$ (located on the internal side of the pontoon)<br>204 $m^3$ (located on the inside corners of the columns |

#### 3.10.2.1 MODU

An IV or MODU will be used to conduct the P&A activities (see Section 3.7). Specifications of a typical MODU is are provided in Table 3-22.

**Table 3-22: Typical MODU details**

| Parameter | Description |
|---|---|
| Type | Semi-submersible MODU |
| Accommodation | 130 |
| Station Keeping | Moored |
| Fuel storage | 1410 $m^3$ |
| Fuel type | Marine diesel |

**MODU Mooring**

The MODU will moor using a system of chains/wires and anchors. A mooring analysis will be undertaken to determine the appropriate mooring system for each P&A well location. Anchoring operations will be conducted to ensure the anchors are placed away from the field subsea infrastructure and to set them in place with adequate tension applied.

The mooring analysis will determine whether any pre-laid mooring lines are required. A pre-laid system can withstand higher sea states compared to a system that only uses the rig's mooring chain/equipment. Installation and proof tensioning of pre-laid mooring involves some disturbance to the seabed prior to the MODU arrival. Anchor handling vessels are used in the deployment and recovery of the mooring system and may be used to assure the mooring.

#### 3.10.2.2 Vessel Selection

Selection of the IV/MODU will be based on technical requirements for P&A and equipment recovery operations and on Eni's rig selection criteria, which considers technical and HSE suitability for the P&A and recovery of subsea equipment activity.

IV/MODU selection criteria include:

- The Contractor must be able to meet Eni's and Australian Regulatory environmental and safety standards and requirements, and must operate under a NOPSEMA accepted Vessel Safety Case.
- The Contractor must meet Eni's Pre-qualification assessment.
- Qualify for 50-year seasonal extreme weather survival.

The IV/MODU will typically operate on marine diesel for the duration of the activity.

#### 3.10.2.3 Installation Vessel and Vessel Operations

This section describes the scope of the Petroleum Activities Program used for consideration of the environmental risks and impacts presented in Section 7 and Section 8.

Operational discharge streams from the IV/MODU and vessels are likely to include:

- deck drainage/storm water
- putrescible waste and sewage/grey water
- oily water
- cooling water
- desalination plant effluent (brine) and backwash water discharge
- ballast water.

**Deck Drainage**

During the Petroleum Activities Program, the IV/MODU and vessels are likely to receive rainfall on deck. Deck cleaning/wash-down may also occur as part of standard operations. Deck water will be discharged to sea and may contain detergents and contaminants in trace quantities such as wash chemicals.

**Putrescible Waste and Sewage**

The volume of sewage and food waste is directly proportional to the number of persons on-board the IV/MODU and vessels. Approximately 30 to 40 L of sewage/grey water will be generated per person per day. Putrescible waste will consist of approximately 1 L of food waste per person per day.

**Oily Water**

Bilge water that is generated in proximity to equipment (such as in the engine room) may contain residual hydrocarbons. Bunded spaces around machinery may also contain oily water. Oily water will be directed to a bilge water tank and either treated and released to the marine environment, or transferred onshore for disposal.

**Cooling Water**

Seawater is used as a heat exchange medium for the cooling of machinery engines. Seawater is drawn from the ocean and flows counter current through closed-circuit heat exchangers, transferring heat from the vessel engines and machinery to the seawater. The seawater is then discharged to the ocean (i.e. it is a once-through system). Cooling water temperatures vary depending upon the vessels engines workload and activity. Cooling water may contain inhibitors to protect against corrosion cavitation erosion, mineral scale deposits and electrolysis.

**Desalination Plant Effluent (Brine) and Backwash Water Discharge**

Effluents from the water supply systems on-board the IV/MODU and vessels will be discharged to the marine environment at a salinity higher than seawater. The volume of the discharge is dependent on the requirement for fresh (or potable) water and will vary between the vessels and the number of people on-board.

The effluent may contain scale inhibitors that controls inorganic scale formation, such as the formation of calcium carbonate and magnesium hydroxide, in water-making plants. Other water treatment chemicals such as chlorine may also be added to the potable water. Other water-making plant cleaning chemicals may be used and discharged to sea after completion of the cleaning process.

**Ballast Water**

The IV/MODU and vessels contain ballast seawater for stability reasons and may need to exchange ballast seawater on location. This will be done in accordance with the Australian Ballast Water Management Requirements 2017 (see Section 8.1).

**Solid and Liquid Waste**

Non-hazardous solid wastes including paper, plastics and packaging; and hazardous solid wastes such as batteries, fluorescent tubes, medical wastes and aerosol cans will be generated during the Activity. Liquid waste such as, but not limited to, used engine oil, hydraulic fluids, solvents, paints, etc. may also be produced during the drilling activity. All of these wastes are disposed of onshore.

### 3.10.3 Refuelling

At sea refuelling/bunkering may be required during the Petroleum Activities Program, depending on the duration of the specific activity.

### 3.10.4 Helicopters

Crew changes will only be required during the P&A and recovery of subsea equipment activities and will be undertaken using helicopters as required (approximately three to five trips per week during P&A). Helicopter operations within the Operational Area are limited to helicopter take-off and landing on the IV/MODU helideck.

### 3.10.5 Remotely Operated Vehicles

ROVs will be utilised throughout the Petroleum Activities Program. Cathodic protection surveys, visual inspections, cleaning and testing of subsea structures will be undertaken during field management using ROVs, deployed from a vessel.

ROVs will also be used for subsea operations and observations during P&A and recovery of subsea equipment. They will also be utilised for emergency WCE control functioning, in the event there is an issue with the surface control system.

### 3.10.6 Emergency Disconnect Sequence

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

The EDS will be part of the response for the emergency situations, while in the case of a cyclone event, the weather forecasting will provide sufficient time to disconnect and make the well secure before leaving the location away from the approaching cyclone.

# 4 DESCRIPTION OF THE ENVIRONMENT

This section summarises the key physical, biological, socio-economic and cultural characteristics of the Operational Area and Zone of Potential Impact (ZPI). A detailed and comprehensive description of the environment (required by OPGGS(E)R 2009, Section 13(3)) in these areas is provided Appendix C. Copies of the DoAWE Protected Matters Search Tool outputs for the Operational Area and the ZPI are also available in Appendix C.

## 4.1 Zone of Potential Impact

The ZPI is based on the largest credible spill scenarios identified and modelled during the risk assessment process, these are presented in Table 4-1 along with the thresholds applied. Individual ZPIs for each of the scenarios were combined to create an overall ZPI (Figure 4-1) for the Petroleum Activities Program.

**Table 4-1: Credible spill scenarios and thresholds applied to create ZPI**

| Spill scenario | Threshold applied to create ZPI | EP Section |
|---|---|---|
| Subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days) | Shoreline contact hydrocarbon (10 g/m²)<br>Surface hydrocarbon (1 g/m²)<br>Entrained hydrocarbon (100 ppb)<br>Dissolved aromatic hydrocarbon (6 ppb) | Section 8.5 |
| Subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days) | Shoreline contact hydrocarbon (10 g/m²)<br>Surface hydrocarbon (1 g/m²)<br>Dissolved WAF (6 ppb)<br>Total WAF (70 ppb) | Section 8.6 |
| Vessel or IV collision leading to release of (500 m³) marine diesel | Shoreline contact hydrocarbon (10 g/m²)<br>Surface hydrocarbon (1 g/m²)<br>Entrained hydrocarbon (100 ppb)<br>Dissolved aromatic hydrocarbon (6 ppb) | Section 8.7 |

Further discussion on the thresholds applied and potential impacts on the environment are contained in Section 8.4.

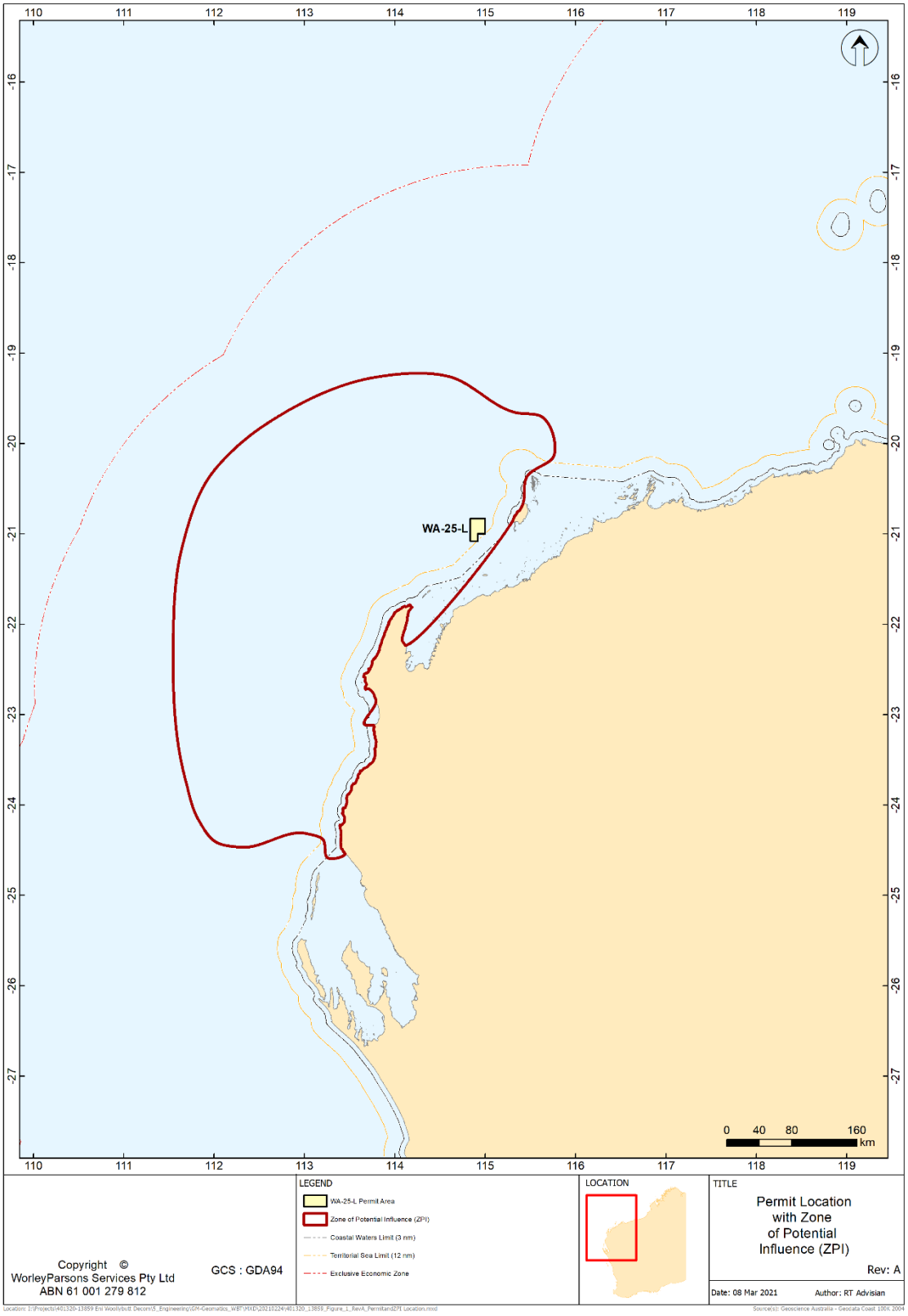



**Figure 4-1: The ZPI for Woollybutt Petroleum Activities Program**

## 4.2 Bioregion

WA-25-L lies on the continental shelf within the North-west marine region, which covers the Commonwealth Marine Area extending from the Western Australian–Northern Territory border to Kalbarri, south of Shark Bay in Western Australia (Figure 4-2). The North West Commonwealth Marine Area covers approximately 1.07 million square kilometres and is characterised by tropical and sub-tropical marine areas and includes shallow waters on the continental shelf at the state water's boundary 3 nautical miles (5.5 kilometres) from shore, to deep ocean habitat 200 nautical miles (370 kilometres) from shore (Commonwealth of Australia, 2012).

The major physical features of the region include:

- highly diverse coral reefs including Ashmore, Hibernia, Scott, Seringapatam, Ningaloo and the Rowley Shoals, all of which sustain species of both conservation and commercial importance
- coralline algal reefs carbonate pinnacles and shoals in the region's far north
- vast areas of continental shelf and slope, plateaux and terraces including the Exmouth and Scott plateaux, the North West and Sahul shelfs, the Wallaby Saddle and the Rowley Terrace
- Australia's narrowest continental shelf, which occurs close to North West Cape, at just 7 kilometres in width
- the Indonesian Throughflow, a low-salinity water mass that acts as a major element of the global transfer of heat and water between oceans and plays a key role in initiating the Leeuwin Current
- the Joseph Bonaparte Gulf, a basin with a soft sediment floor, which is home to a low coverage of mobile invertebrates and sessile filter-feeding organisms
- major canyons on the continental slope that facilitate sediment and nutrient transport, including Cape Range, Cloates, Carnarvon and Swan canyons
- two areas of abyssal plain (Cuvier and Argo) with depths greater than 5000 metres.

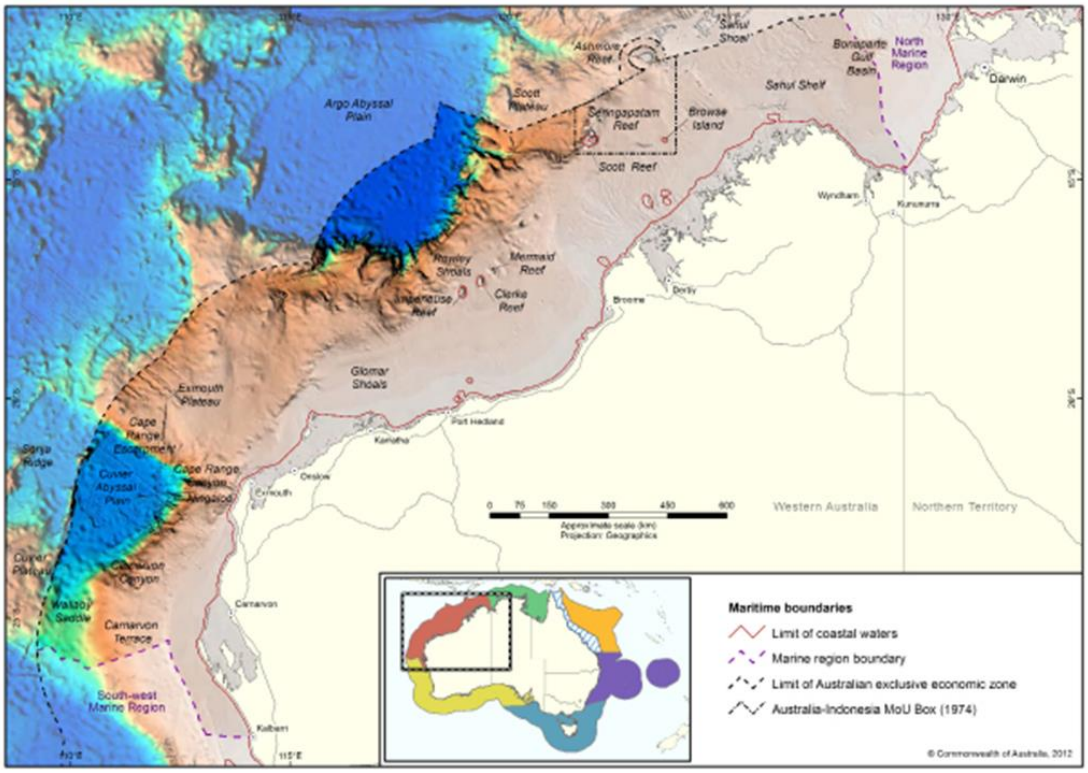



**Figure 4-2: North-West marine region (Commonwealth of Australia, 2012)**

The majority of the NWMR has low productivity, with monsoonal seasonality driving boom and bust cycles for a number of species. These monsoonal climate patterns include highly variable tidal regimes and a cyclone season that falls between December and March. However, notable locations have higher productivity (Commonwealth of Australia, 2012). These are:

- Ningaloo Reef and the associated Cloates and Cape Range canyons
- Carnarvon Canyon in the south of the region and other canyon systems
- coral reefs along the shelf edge including Ashmore, Scott, Seringapatam and the Rowley Shoals
- the carbonate banks and pinnacles of the Sahul Shelf.

The NWMR is relatively shallow, with more than 40 percent of the region being less than 200 metres deep. Therefore, surface currents have a strong influence. Another major factor driving ecological processes in the region is the strong seasonality of rainfall and wind direction (Commonwealth of Australia, 2012). The weakening of the Indonesian Throughflow and Leeuwin Current in the dry season (April to September and particularly during El Niño years), paired with the seasonal reversal in wind, boosts productivity through increased mixing of surface waters and deeper, nutrient-rich waters (Commonwealth of Australia, 2012).

## 4.3 Threatened and Migratory Species and Ecological Communities

Searches for matters of national environmental significance (MNES) and other matters protected by the EPBC Act were undertaken using Protected Matters Search Tool (PMST)

in February 2021 on areas that covered the Operational Area and ZPI. The threatened/migratory species identified using the EPBC Act Protected Matters Search Tool are listed in Table 4-2. The EPBC Act PMST reports for the Operational Area and ZPI are provided in Appendix C, Section 1.6.

The PMST search identified 20 species listed as `threatened' and 35 species listed as `migratory' within the Operational Area. In the wider ZPI, the PMST search identified 41 species listed as `threatened' and 58 species listed as `migratory'. Listed marine species that may occur within the Operational area and ZPI are listed in Table 4-2, with further detail provided in Appendix C. Note that terrestrial species (such as terrestrial mammals, reptiles and bird species) that appear in the PMST results of the ZPI and do not have habitats along shorelines are not relevant to Petroleum Activities Program and have been excluded from Table 4-2**.** There are no listed threatened ecological communities within the Operational Area or the ZPI

**Table 4-2: EPBC Act listed species within the Operational Area and ZPI (DoAWE, 2021)**

| Species | Common Name | Status | Presence in Operational Area | Presence in ZPI |
|---|---|---|---|---|
| **Birds** | | | | |
| *Calidris canutus* | Red Knot, Knot | Endangered/ Migratory | Species or species habitat may occur within area | Species or species habitat known to occur within area |
| *Calidris ferruginea* | Curlew Sandpiper | Critically Endangered/ Migratory | Species or species habitat may occur within area | Species or species habitat known to occur within area |
| *Limosa lapponica menzbieri* | Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit | Critically Endangered/ Migratory | NA | Species or species habitat may occur within area |
| *Macronectes giganteus* | Southern Giant-Petrel, Southern Giant Petrel | Endangered/ Migratory | Species or species habitat may occur within area | Species or species habitat may occur within area |
| *Numenius madagascariensis* | Eastern Curlew, Far Eastern Curlew | Critically Endangered/ Migratory | Species or species habitat may occur within area | Species or species habitat known to occur within area |
| *Pterodroma mollis* | Soft-plumaged Petrel | Vulnerable | NA | Foraging, feeding or related behavior likely to occur within area |

| Species | Common Name | Status | Presence in Operational Area | Presence in ZPI |
|---|---|---|---|---|
| *Sternula nereis* | Australian Fairy Tern | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | Breeding known to occur within area |
| *Thalassarche cauta* | Shy Albatross | Endangered/ Migratory | NA | Species or species habitat may occur within area |
| *Thalassarche impavida* | Campbell Albatross, Campbell | Vulnerable/ Migratory | NA | Species or species habitat may occur within area |
| *Thalassarche melanophris* | Black-browed Albatross | Vulnerable/ Migratory | NA | Species or species habitat may occur within area |
| *Thalassarche cauta steadi* | White-capped Albatross | Vulnerable/ Migratory | NA | Species or species habitat may occur within area |
| *Anous stolidus* | Common Noddy | Migratory | Species or species habitat may occur within area | Species or species habitat likely to occur within area |
| *Apus pacificus* | Fork-tailed Swift | Migratory | NA | Species or species habitat likely to occur within area |
| *Ardenna carneipes* | Flesh-footed Shearwater, Fleshy-footed Shearwater | Migratory | NA | Species or species habitat likely to occur within area |
| *Ardenna pacifica* | Wedge-tailed Shearwater | Migratory | NA | Breeding known to occur within area<br>Overlap with breeding BIA |
| *Calonectris leucomelas* | Streaked Shearwater | Migratory | Species or species habitat likely to occur within area | Species or species habitat likely to occur within area |
| *Fregata ariel* | Lesser Frigatebird, Least Frigatebird | Migratory | Species or species habitat likely to occur within area | Species or species habitat known to occur within area |
| *Fregata minor* | Great Frigatebird, Greater Frigatebird | Migratory | NA | Species or species habitat may occur within area |
| *Hydroprogne caspia* | Caspian Tern | Migratory | NA | Breeding known to occur within area |
| *Onychoprion anaethetus* | Bridled Tern | Migratory | NA | Breeding known to occur within area |

| Species | Common Name | Status | Presence in Operational Area | Presence in ZPI |
|---|---|---|---|---|
| *Sterna dougallii* | Roseate Tern | Migratory | NA | Breeding known to occur within area<br>Overlap with breeding BIA |
| *Actitis hypoleucos* | Common Sandpiper | Migratory | Species or species habitat likely to occur within area | Species or species habitat known to occur within area |
| *Calidris acuminata* | Sharp-tailed Sandpiper | Migratory | Species or species habitat likely to occur within area | Species or species habitat known to occur within area |
| *Calidris melanotos* | Pectoral Sandpiper | Migratory | Species or species habitat likely to occur within area | Species or species habitat may occur within area |
| *Charadrius veredus* | Oriental Plover, Oriental Dotterel | Migratory | NA | Species or species habitat may occur within area |
| *Glareola maldivarum* | Oriental Pratincole | Migratory | NA | Species or species habitat may occur within area |
| *Pandion haliaetus* | Osprey | Migratory | Species or species habitat likely to occur within area | Breeding known to occur within area |
| *Tringa nebularia* | Common Greenshank, Greenshank | Migratory | NA | Species or species habitat likely to occur within area |
| **Fish, Sharks and Rays** | | | | |
| *Milyeringa veritas* | Blind Gudgeon | Vulnerable | NA | Species or species habitat known to occur within area |
| *Ophisternon candidum* | Blind Cave Eel | Vulnerable | NA | Species or species habitat known to occur within area |
| *Anoxypristis cuspidata* | Narrow Sawfish, Knifetooth Sawfish | Migratory | Species or species habitat may occur within area | 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 | Migratory | Species or species habitat may occur within area | Species or species habitat known to occur within area |

| Species | Common Name | Status | Presence in Operational Area | Presence in ZPI |
|---|---|---|---|---|
| *Manta birostris* | Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray | Migratory | Species or species habitat likely to occur within area | Species or species habitat known to occur within area |
| *Carcharias taurus* (west coast population) | Grey Nurse Shark (west coast population) | Vulnerable | Species or species habitat may occur within area | Species or species habitat known to occur within area |
| *Carcharodon carcharias* | White Shark, Great White Shark | Vulnerable/ Migratory | Species or species habitat may occur within area | Species or species habitat known to occur within area |
| *Pristis clavate* | Dwarf Sawfish, Queensland Sawfish | Vulnerable/ Migratory | Species or species habitat known to occur within area | Species or species habitat known to occur within area |
| *Pristis zijsron* | Green Sawfish, Dindagubba, Narrowsnout Sawfish | Vulnerable/ Migratory | Species or species habitat known to occur in area | Species or species habitat known to occur within area |
| *Lamna nasus* | Porbeagle, Mackerel Shark | Migratory | NA | Species or species habitat may occur within area |
| *Rhincodon typus* | Whale Shark | Vulnerable/ Migratory | Foraging, feeding or related behaviour likely to occur within area<br>Overlap with foraging BIA | Foraging, feeding or related behaviour known to occur within area<br>Overlap with foraging BIA |
| *Isurus oxyrinchus* | Shortfin Mako, Mako Shark | Migratory | Species or species habitat likely to occur in area | Species or species habitat likely to occur within area |
| *Isurus paucus* | Longfin Mako | Migratory | Species or species habitat likely to occur in area | Species or species habitat likely to occur within area |
| **Marine Mammals** | | | | |
| *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 |

| Species | Common Name | Status | Presence in Operational Area | Presence in ZPI |
|---|---|---|---|---|
| *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 |
| *Eubalaena australis/Balaena glacialis australis* | Southern Right Whale | Endangered/ Migratory | Species or species habitat may occur within area | Species or species habitat likely to occur within area |
| *Megaptera novaeangliae* | Humpback Whale | Vulnerable/ Migratory | Species or species habitat known to occur within area<br>Overlap with migratory BIA | Congregation or aggregation known to occur within area<br>Overlap with migratory BIA |
| *Balaenoptera edeni* | Bryde's Whale | Migratory | Species or species habitat may occur within area | Species or species habitat likely to occur within area |
| *Dugong dugon* | Dugong | Migratory | NA | Breeding known to occur within area |
| *Orcinus orca* | Killer Whale, Orca | Migratory | Species or species habitat may occur within area | Species or species habitat may occur within area |
| *Physeter macrocephalus* | Sperm Whale | Migratory | Species or species habitat may occur within area | Species or species habitat may occur within area |
| *Sousa chinensis* | Indo-Pacific Humpback Dolphin | Migratory | NA | Species or species habitat known to occur within area |
| *Tursiops aduncus* (Arafura/Timor Sea populations) | Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) | Migratory | Species or species habitat known to occur within area | Species or species habitat known to occur within area |
| **Reptiles** | | | | |
| *Aipysurus apraefrontalis* | Short-nosed Seasnake | Critically Endangered | NA | Species or species habitat known to occur within area |

| Species | Common Name | Status | Presence in Operational Area | Presence in ZPI |
|---|---|---|---|---|
| *Caretta* | Loggerhead Turtle | Endangered/ Migratory | Species or species habitat known to occur within area | Breeding known to occur within area<br>Overlapping with internesting BIA |
| *Chelonia mydas* | Green Turtle | Vulnerable/ Migratory | Species or species habitat known to occur within area | Breeding known to occur within area<br>Overlapping with foraging, nesting and internesting BIA |
| *Dermochelys coriacea* | Leatherback Turtle, Leathery Turtle, Luth | Endangered/ Migratory | Species or species habitat likely to occur within area | Foraging, feeding or related behavior known to occur within area<br>Overlapping with foraging, nesting and internesting BIA |
| *Eretmochelys imbricata* | Hawksbill Turtle | Vulnerable/ Migratory | Species or species habitat known to occur within area | Breeding known to occur within area<br>Overlapping with foraging, nesting and internesting BIA |
| *Natator depressus* | Flatback Turtle | Vulnerable/ Migratory | Congregation or aggregation known to occur within area | Breeding known to occur within area<br>Overlapping with foraging, nesting and internesting BIA |

Each of the species are listed in Table 4-2 and discussed below on the basis they may occur in the ZPI at various times of the year, generally as transient visitors to the area during migration and feeding. No known breeding grounds or sensitive habitat environments critical to the species outlined in Table 4-2 are known to exist within the Operational Area. There are breeding grounds for birds, fish, dugongs and turtles within the ZPI.

A number of other marine species that are protected under the EPBC Act and relevant international agreements, but are not listed as Matters of National Environmental Significance under the EPBC Act are also described below, as these species could also occur in the ZPI. A list of these species is provided in Table 4-3 (DoEE, 2017).

Table 4-3 descriptions of threatened marine species and their presence relative to the Operational Area and ZPI are presented in Appendix C.

**Table 4-3: Conservation advice for EPBC Act listed threatened species within the ZPI (DoEE, 2017)**

| Common Name | Conservation Advice/ Recovery Plan | Relevant Threats Identified | Relevant Management Advice |
|---|---|---|---|
| **Birds** | | | |
| Red knot, knot | Approved Conservation Advice for *Calidris canutus* (red knot) (TSSC, 2016) | Habitat degradation – oil pollution | • No explicit relevant management actions. Oil pollution is recognised as a threat. |
| Curlew sandpiper | Approved Conservation Advice for *Calidris ferruginea* (curlew sandpiper) (TSSC, 2015) | Habitat degradation – oil pollution | • No explicit relevant management actions. Oil pollution is recognised as a threat. |
| Bar-tailed godwit (baueri), western Alaskan bar-tailed godwit | Approved Conservation Advice for *Limosa lapponica baueri* (bar-tailed godwit (western Alaskan)) (TSSC, 2016) | Habitat degradation – oil pollution | • No explicit relevant management actions. Oil pollution is recognised as a threat. |
| Northern Siberian bar-tailed godwit, bar-tailed godwit | Approved Conservation Advice for *Limosa lapponica menzbieri* (bar-tailed godwit (northern Siberian)) (TSSC, 2016) | Habitat degradation – oil pollution | • No explicit relevant management actions. Oil pollution is recognised as a threat. |
| Southern giant-petrel | National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DoSEWPC, 2011) | Vessel disturbance<br>Oil pollution | • Evaluate risk of oil spill impact to nest locations and implement appropriate mitigation measures if required. All vessels to be in compliance with relevant pollution regulations. |
| Eastern curlew, far eastern curlew | Approved Conservation Advice for *Numenius madagascariensis* (eastern curlew) (TSSC, 2015) | Habitat degradation/modification (oil pollution) | • No explicit relevant management actions. Oil pollution is recognised as a threat. |
| Soft-plumaged petrel | Approved Conservation Advice for *Pterodroma mollis* (soft-plumaged petrel) (TSSC, 2015) | Habitat degradation/modification | • No explicit relevant management actions. |
| Australian fairy tern | Commonwealth Conservation Advice on *Sternula nereis* (fairy tern) (TSSC, 2011) | Habitat degradation/modification (oil pollution) | • Ensure appropriate oil-spill contingency plans exist to manage subspecies' breeding sites which are vulnerable to oil spills. |

| Common Name | Conservation Advice/ Recovery Plan | Relevant Threats Identified | Relevant Management Advice |
|---|---|---|---|
| Tasmanian shy albatross | National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DoSEWPC, 2011) | Vessel disturbance<br>Oil pollution | • No explicit relevant management actions. Oil pollution is recognised as a threat. |
| Common sandpiper, sharp-tailed sandpiper, red knot, oriental plover, oriental pratincole, bar-tailed godwit, common greenshank | Wildlife conservation plan for migratory shorebirds (Commonwealth of Australia, 2015c) | Habitat degradation/ modification (oil pollution) | • No explicit relevant management actions; oil spills recognised as a threat. |
| **Fish** | | | |
| Blind gudgeon | Commonwealth Conservation Advice on *Milyeringa veritas* (Blind Gudgeon) (TSSC, 2008) | Habitat degradation/modification<br>Invasive species (predatory fish) | • None relevant to the proposed activity. Manage sites to control introduced fish species. |
| Blind cave eel | Commonwealth Conservation Advice on *Ophisternon candidum* (Blind Cave Eel) (TSSC, 2008) | Habitat degradation/modification<br>Invasive species (predatory fish) | • None relevant to the proposed activity. Manage sites to control introduced fish species. |
| Grey nurse shark (west coast population) | Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DotE, 2014) | None | • No explicit relevant management actions. |
| White shark, great white shark | Recovery Plan for the White Shark (*Carcharodon carcharias*) (DoSEWPC, 2013) | None | • No explicit relevant management actions. |
| Dwarf sawfish, Queensland sawfish | Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (TSSC, 2009)<br>Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis, Pristis zijsron, Pristis clavata, Glyphis and Glyphis garricki*) (Commonwealth of Australia, 2015) | Habitat degradation/modification | • No explicit relevant management actions. Threats identified include habitat loss, disturbance and modification.<br>• Identify risks to important habitats for sawfish and the mitigation measures required. |

| Common Name | Conservation Advice/ Recovery Plan | Relevant Threats Identified | Relevant Management Advice |
|---|---|---|---|
| Green sawfish, Dindagubba, narrowsnout sawfish | Approved Conservation Advice for *Pristis zijsron* (Green Sawfish) (TSSC, 2008)<br>Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis, Pristis zijsron, Pristis clavata, Glyphis and Glyphis garricki*) (Commonwealth of Australia, 2015) | Habitat degradation/modification | • No explicit relevant management actions. Threats identified include habitat loss, disturbance and modification.<br>• Identify risks to important habitats for sawfish and the mitigation measures required. |
| Whale shark | Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015) | Vessel disturbance<br>Habitat degradation/modification | • Assess impacts to whale sharks from offshore installations and associated environmental changes (chronic noise, light spill, water temperature changes, altered nutrient levels) and the mitigation measures required.<br>• Evaluate risk of vessel interactions and ensure appropriate mitigation measures are implemented if required (collision avoidance systems).<br>• Minimise offshore development and transit of large vessels near habitats which correlate with whale shark aggregations and along the northward migration route along the 200 m isobath off the northern Western Australian coastline. |

| Common Name | Conservation Advice/ Recovery Plan | Relevant Threats Identified | Relevant Management Advice |
|---|---|---|---|
| **Marine Mammals** | | | |
| Sei whale | Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015) | Noise interference<br>Vessel disturbance | • Evaluate risk of sound impacts to cetaceans and, if required, appropriate mitigation measures are implemented.<br>• Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.<br>• Ensure all vessel strike incidents are reported in the National Vessel Strike Database.<br>• Evaluate risk of sound impacts to cetaceans and, if required, appropriate mitigation measures are implemented.<br>• Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.<br>• Ensure all vessel strike incidents are reported in the National Vessel Strike Database. |
| Blue whale | Conservation Management Plan for the Blue Whale – A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia, 2015) | Noise interference<br>Vessel disturbance | • Evaluate risk of sound impacts to cetaceans and, if required, appropriate mitigation measures are implemented.<br>• Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.<br>• Ensure all vessel strike incidents are reported in the National Vessel Strike Database. |

| Common Name | Conservation Advice/ Recovery Plan | Relevant Threats Identified | Relevant Management Advice |
|---|---|---|---|
| Fin whale | Approved Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015) | Noise interference<br>Vessel disturbance | • Once the biologically important areas for fin whales are defined (both spatial and temporal aspects) an assessment of anthropogenic noise impact should be conducted for this species.<br>• Develop a national vessel strike strategy that investigates the risk of vessel strikes on fin whales and also identifies potential mitigation measures.<br>• Evaluate risk of sound impacts to cetaceans and, if required, appropriate mitigation measures are implemented.<br>• Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.<br>• Ensure all vessel strike incidents are reported in the National Vessel Strike Database. |
| Southern right whale | Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* (DoSEWPC, 2012) | Noise interference<br>Vessel disturbance | • Evaluate risk of sound impacts to cetaceans and, if required, appropriate mitigation measures are implemented.<br>• Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.<br>• Ensure all vessel strike incidents are reported in the National Vessel Strike Database. |

| Common Name | Conservation Advice/ Recovery Plan | Relevant Threats Identified | Relevant Management Advice |
|---|---|---|---|
| Humpback whale | Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (TSSC, 2015) | Noise interference<br>Vessel disturbance | • Site-specific modelling should be conducted to investigate acoustic impacts (including cumulative impacts) on humpback whale calving, resting, feeding areas or migratory pathways (for example from pile driving or explosives).<br>• Ensure the risk of vessel strike on humpback whales is considered when assessing actions that increase vessel traffic in areas where humpback whales occur and, if required appropriate mitigation measures are implemented to reduce the risk of vessel strike.<br>• Evaluate risk of sound impacts to cetaceans and, if required, appropriate mitigation measures are implemented.<br>• Ensure all vessel strike incidents are reported in the National Vessel Strike Database. |
| **Marine Reptiles** | | | |
| Short-nosed seasnake | Commonwealth Conservation Advice on *Aipysurus apraefrontalis* (Short-nosed Seasnake) (TSSC, 2011) | Habitat degradation/modification<br>Oil and gas exploration – seismic surveys and drilling | • No explicit relevant management actions. |
| Loggerhead turtle | Recovery plan for marine turtles in Australia (DoEE, 2017) | Vessel disturbance<br>Light pollution<br>Oil pollution | • Vessel interactions identified as a threat. No explicit relevant management actions relating to vessels prescribed in the plan.<br>• Minimise light pollution.<br>• Identify the cumulative impact of onshore and offshore light pollution from multiple sources on turtles.<br>• Ensure spill risk response programs and strategies include management of turtles and turtle habitats. |
| Green turtle | | | |
| Hawksbill turtle | | | |
| Flatback turtle | | | |

| Common Name | Conservation Advice/ Recovery Plan | Relevant Threats Identified | Relevant Management Advice |
|---|---|---|---|
| Leatherback turtle, leathery turtle, luth | Commonwealth Conservation Advice on *Dermochelys coriacea* (TSSC, 2008)<br>Recovery plan for marine turtles in Australia (DoEE, 2017) | Vessel disturbance | • No explicit relevant management actions. Vessel interactions identified as a threat. |

### 4.3.1 Biologically Important Areas

Biologically important areas (BIAs) are those locations where aggregations of members of a species are known to undertake biologically important behaviours, such as breeding, resting, foraging or migration (DoEE, 2017). BIAs have been identified using expert scientific knowledge about species abundance, distribution and behaviours (DoEE, 2017).

BIAs for the following species have been identified within the Operational Area:

- pygmy blue whale –distribution (Figure 4-4)
- humpback whale – migration (Figure 4-4)
- flatback turtle – internesting buffer and suitable mating habitat (Figure 4-5)
- whale shark – foraging including high density prey (Figure 4-3)
- wedge tailed shearwater – breeding and foraging (Figure 4-8).

In addition to the above the following species have been identified within the wider ZPI:

- loggerhead turtle – internesting buffer and suitable nesting habitat (Figure 4-5)
- flatback turtle – internesting buffer and suitable nesting habitat(Figure 4-5)
- green turtle – internesting buffer and suitable nesting habitat (Figure 4-6)
- hawksbill turtle – internesting buffer and suitable nesting habitat (Figure 4-7)
- dugong – foraging including high density seagrass beds, breeding, nursing, calving
- fairy tern – breeding and foraging (Figure 4-8)
- lesser crested tern – breeding and foraging (Figure 4-8)
- roseate tern – breeding and foraging (Figure 4-8).

Where these BIAs apply to threatened and/or migratory species, they are discussed in further detail in the relevant subsections below.

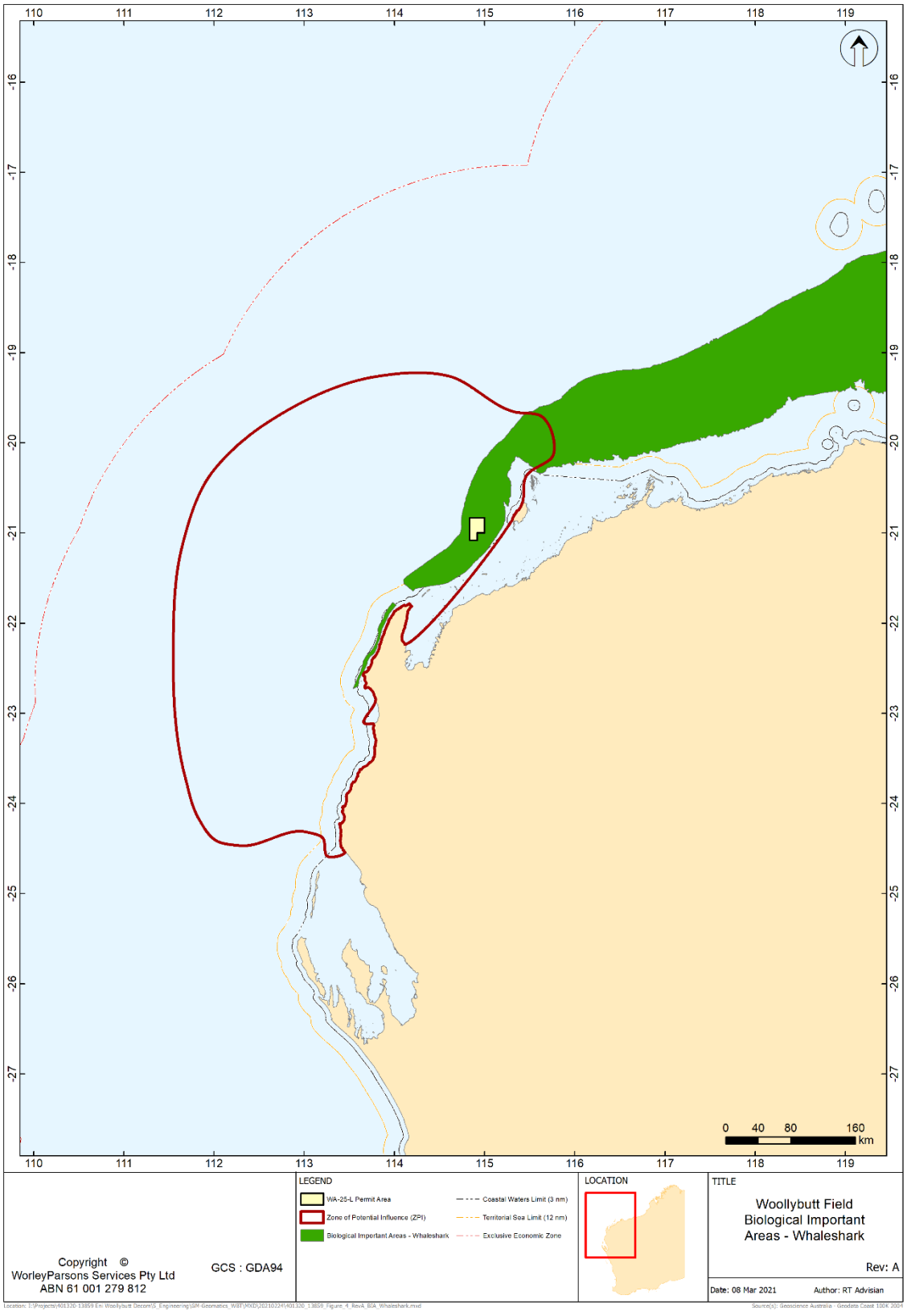



**Figure 4-3: BIA for whale shark**

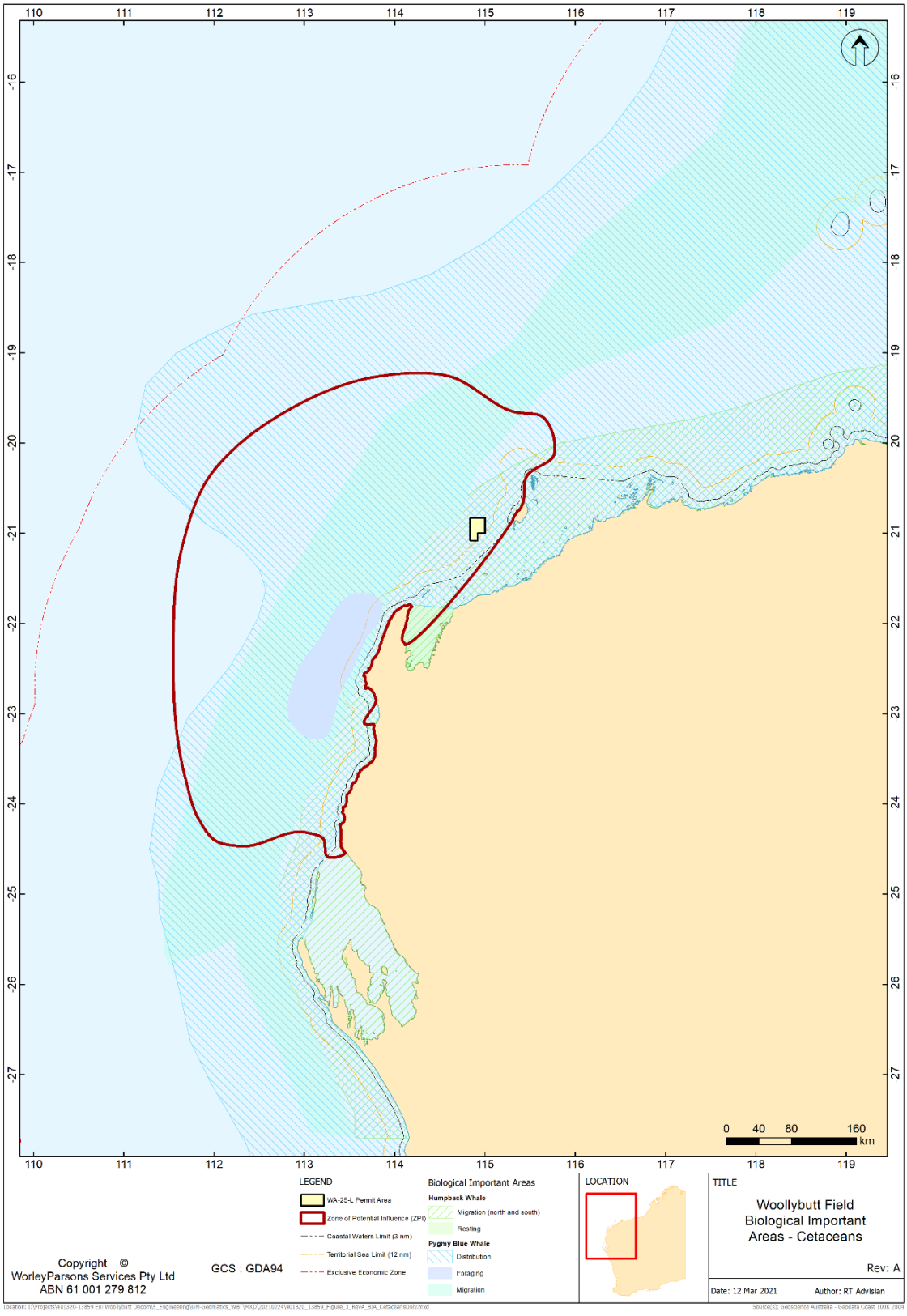



**Figure 4-4: BIAs for cetaceans**

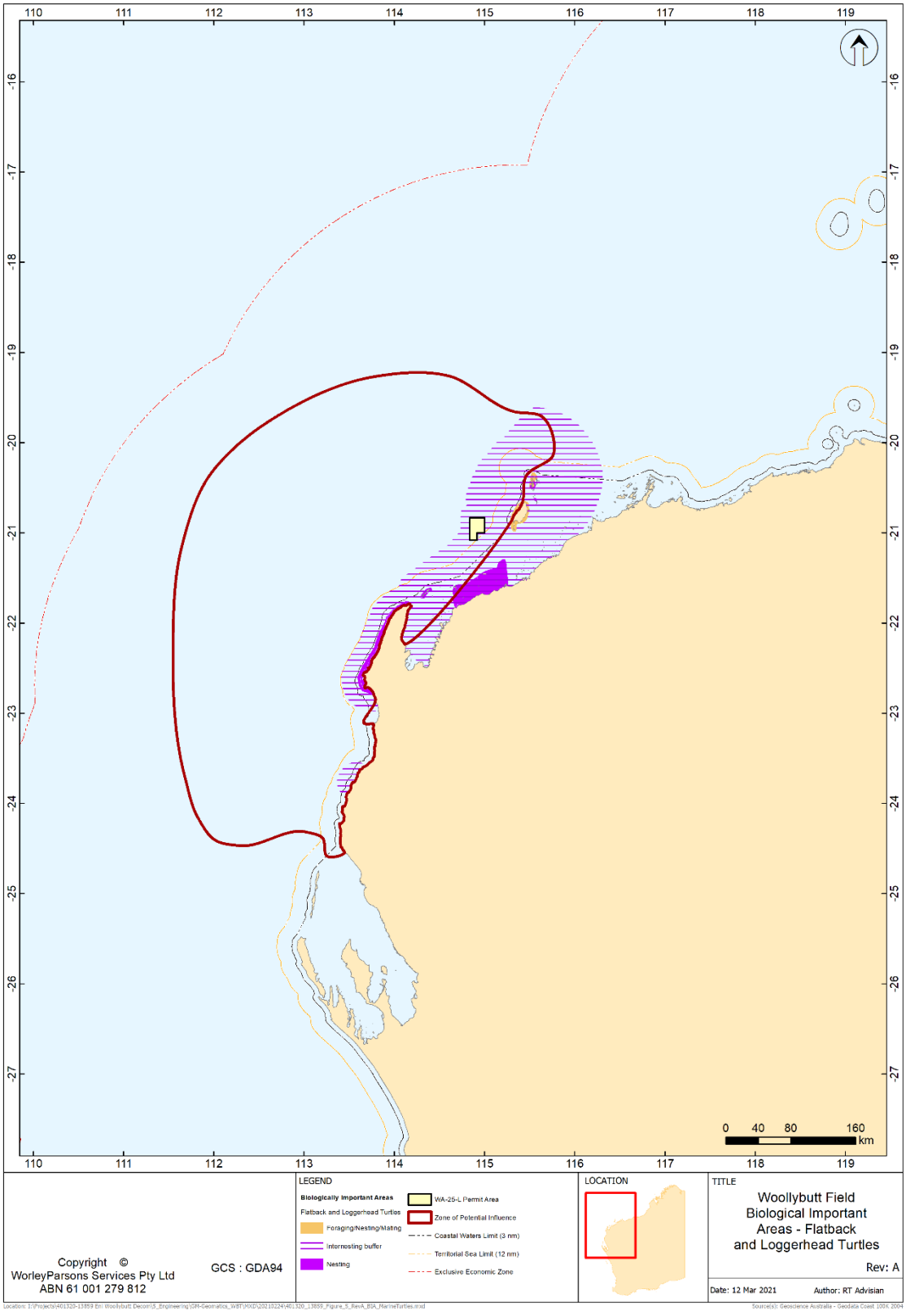



**Figure 4-5: BIAs for flatback and loggerhead turtles**

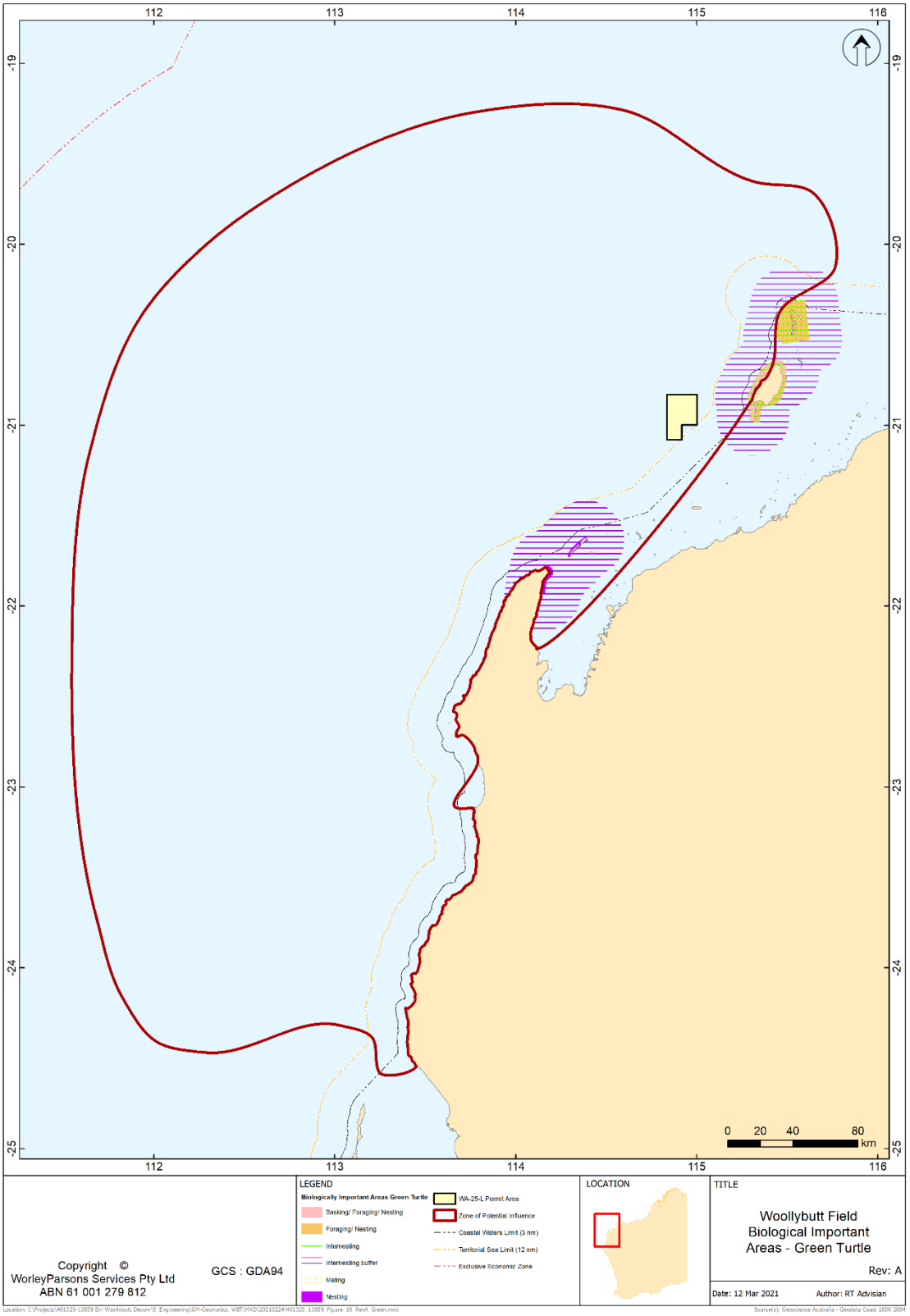



**Figure 4-6: BIA for green turtles**

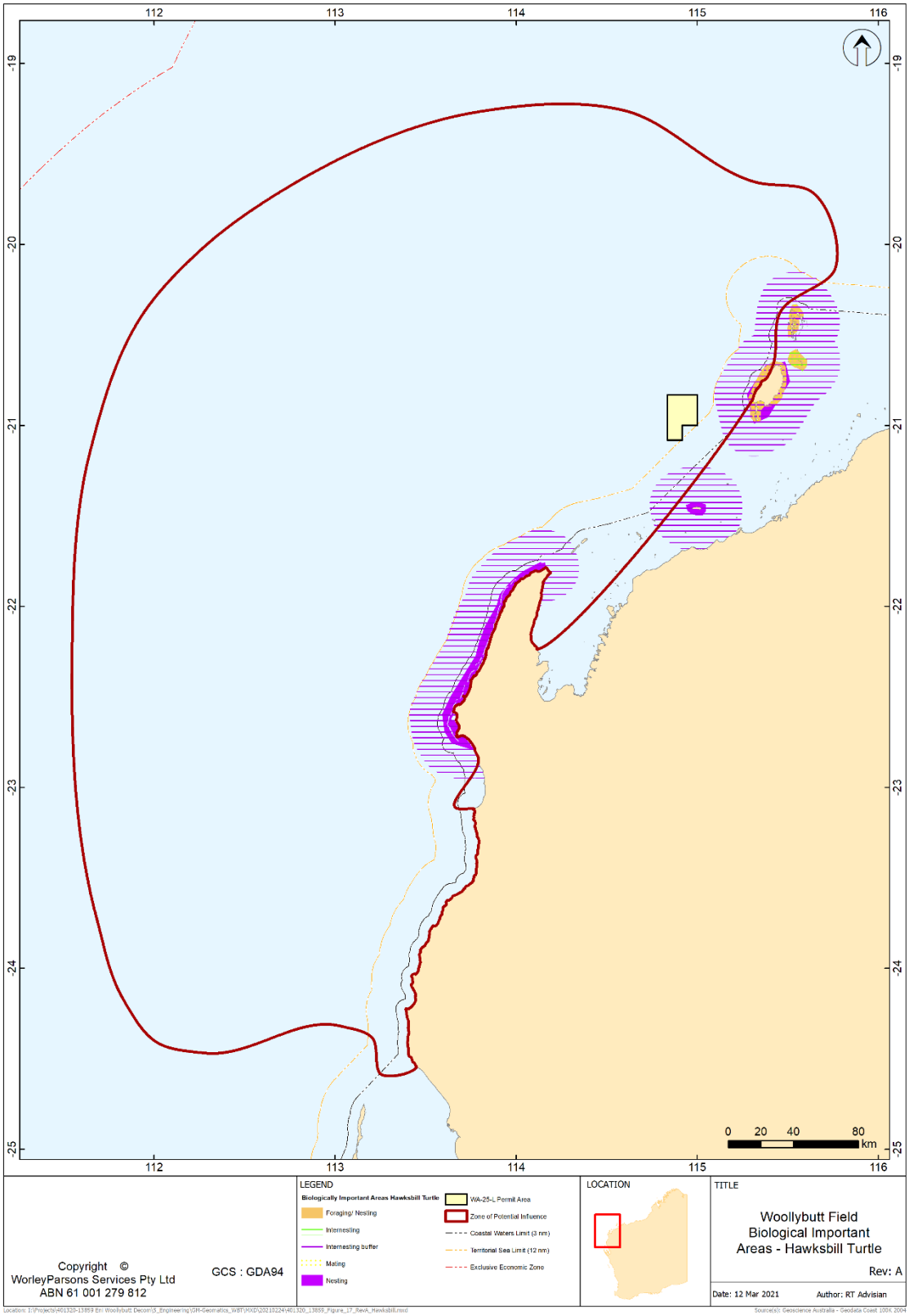



**Figure 4-7: BIA for hawksbill turtles**

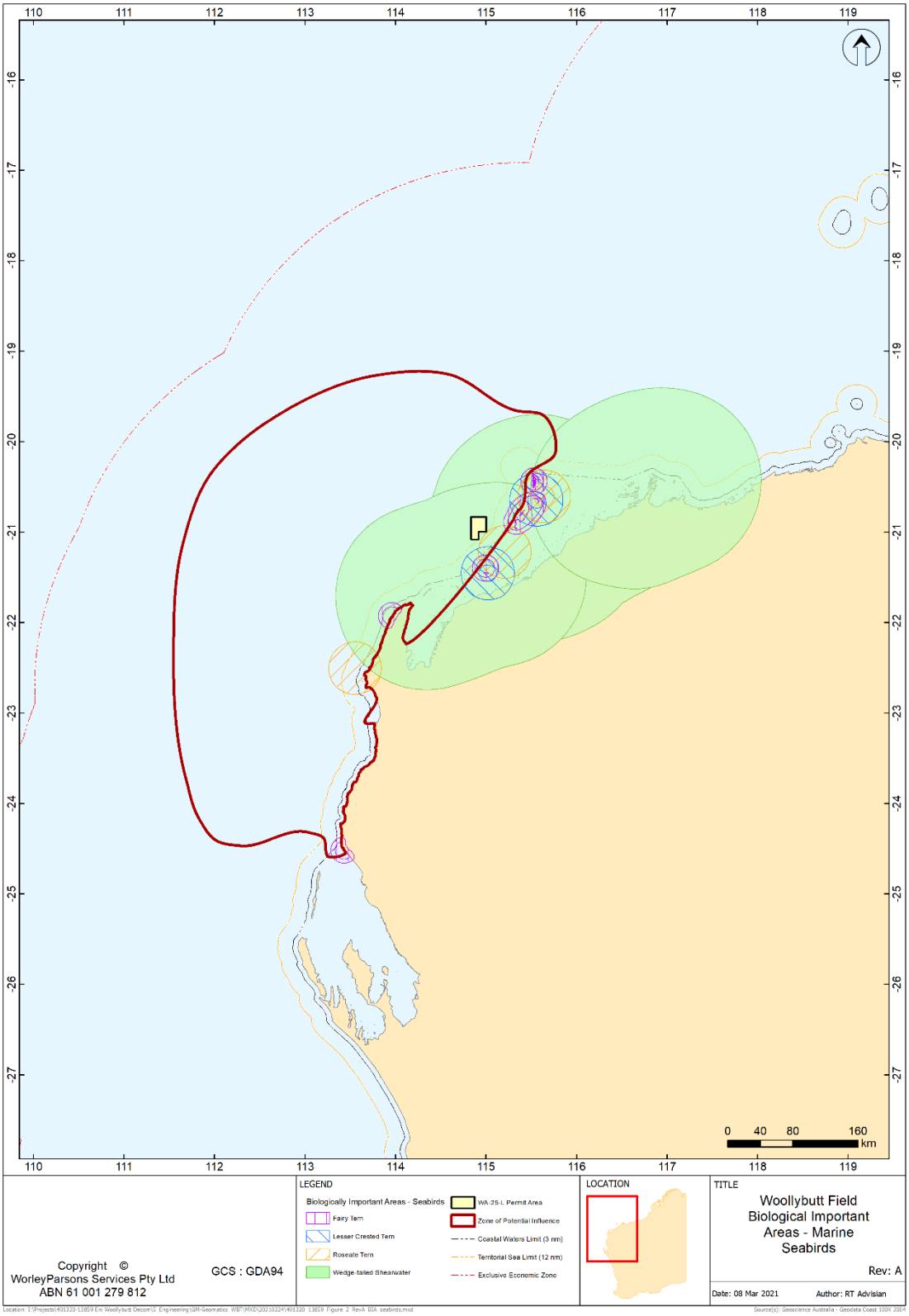



**Figure 4-8: BIAs for seabirds within the ZPI**

## 4.4 Cultural and Socio-Economic Environment

### 4.4.1 Commercial Fisheries

Commercial fisheries that operate in the waters of the NWS are centred in Onslow, 65 km to the south of the field; Exmouth, 120 km to the southwest, and Dampier, approximately 180 km to the east. The focus of commercial fishing activity is mainly the inner continental shelf and waters surrounding the offshore islands to depths of about 30 m. Commonwealth and State Managed Fisheries that overlap the Operational Area and ZPI are summarised below.

### 4.4.2 Commonwealth Fisheries

Commonwealth fisheries within the ZPI listed in Table 4-4. The locations of these fisheries in relation to the ZPI and Operational Area are shown in Figure 4-9.

**Table 4-4: Commonwealth Fisheries within the ZPI and Operational Area**

| Fishery | Fishery zone overlap with OA[1] | Fishery zone overlap with ZPI | Presence in OA[2] | Presence in ZPI[2] |
|---|---|---|---|---|
| Western Tuna and Billfish Fishery | ✓ | ✓ | Rare | Rare |
| North-west Slope Trawl Fishery | | ✓ | Not credible | Rare |
| Southern Bluefin Tuna Fishery | ✓ | ✓ | Rare | Rare |
| Western Deepwater Trawl Fishery | | ✓ | Not credible | Rare |
| Western Skipjack Fishery | ✓ | ✓ | Rare | Rare |

[1] OA = Operational Area

[2] Likelihood of presence evaluated in line with Eni Risk Matrix

Further details and descriptions of Commonwealth fisheries within the Operational Area and ZPI are presented in Appendix C.

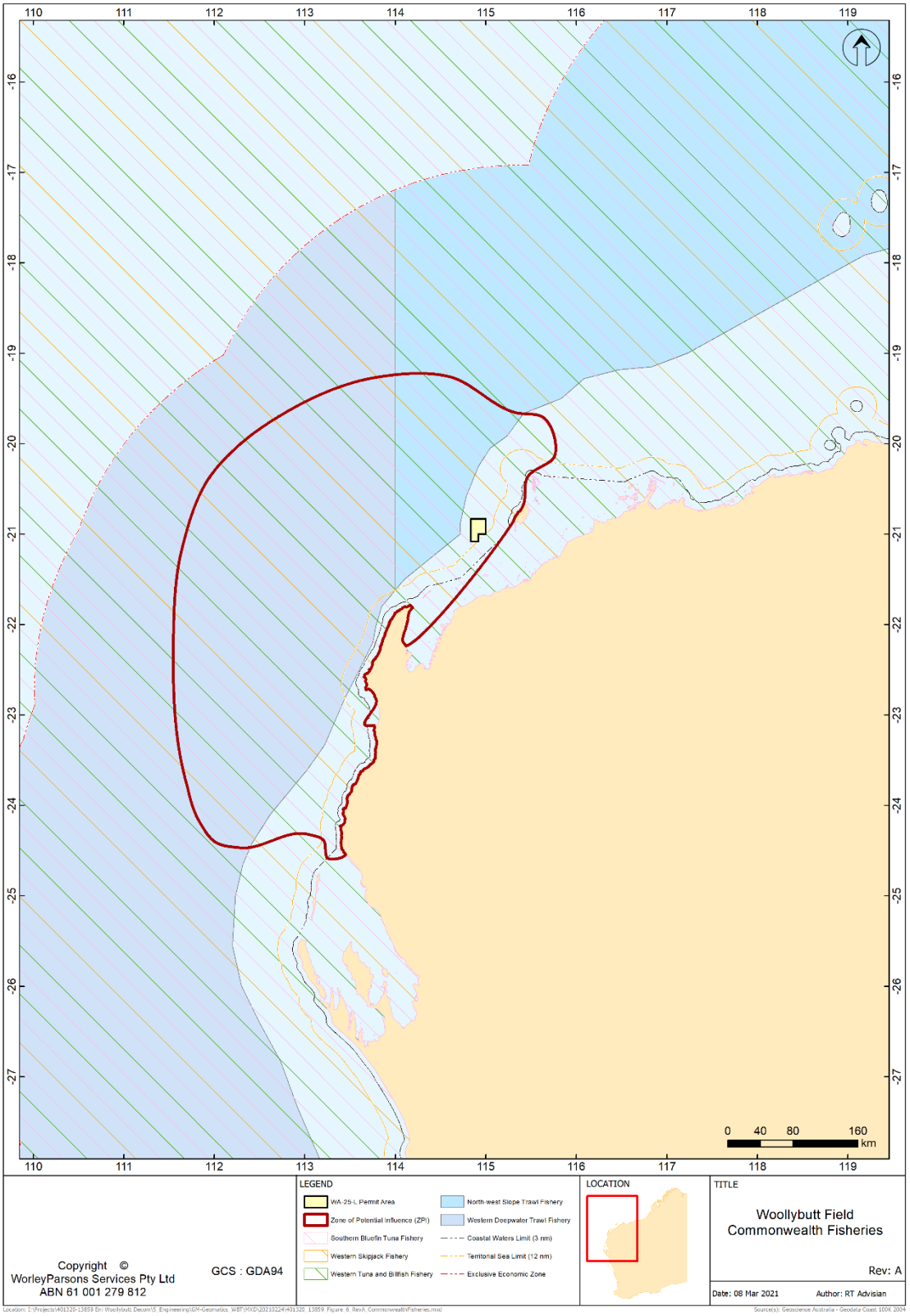



**Figure 4-9: Commonwealth fisheries within the ZPI**

### 4.4.3 State Fisheries

State-managed fisheries within the Operational Area are listed in Table 4-5. The locations of the fisheries in with the potential for interaction with the Petroleum Activities Program shown in Figure 4-10.

**Table 4-5: State Fisheries within the ZPI**

| Fishery | Licensed to fish in WA-25-L | Potential for interaction | Description |
|---|---|---|---|
| **State Managed Fisheries** | | | |
| Mackerel Managed Fishery | ✓ | ✓ | **Description:** The Mackerel Managed Fishery (MMF) targets Spanish mackerel (*Scomberomorus commerson*) using near-surface trawling gear from small vessels in coastal areas around reefs, shoals and headlands. Jig fishing is also used to capture grey mackerel (*S. semifasciatus*), with other species from the genera Scomberomorus (Molony *et al.*, 2015).<br>The commercial fishery extends from Geraldton to the Northern Territory border. There are three managed fishing areas: Kimberley (Area 1), Pilbara (Area 2), and Gascoyne and West Coast (Area 3). WA-25-L is location within Area 3. The majority of the catch is taken from waters off the Kimberley coasts (Lewis and Jones, 2018), reflecting the tropical distribution of mackerel species (Molony *et al.*, 2015). The majority of fishing activity occurs around the coastal reefs of the Dampier Archipelago and Port Hedland area, with the seasonal appearance of mackerel in shallower coastal waters most likely associated with feeding and gonad development prior to spawning (Mackie *et al*. 2003).<br>Spanish mackerel spawn between August and November when inhabiting coastal reef areas of the Exmouth/Gascoyne region, with females exhibiting serial spawning behaviour (spawning every one to three days) over the spawning period. Outside the main fishing season (December to April), it is unclear where the mackerel populations inhabit. However, there is anecdotal evidence to suggest populations move into deeper offshore waters (Mackie *et al.*, 2003).<br>Records show that over the past 4 years, less than three vessels have been in operation annually within the 60 NM and 10 NM blocks that cover WA-25-L (Gaughan *et al*., 2019).<br>**Licences/vessels:** 52 licences in 2017/18 season (Gaughan *et al*., 2019). 14 vessels in 2014 (Molony *et al.*, 2015). Not stated from 2015 to 2018 (Lewis *et al.*, 2018). |

| Fishery | Licensed to fish in WA-25-L | Potential for interaction | Description |
|---|---|---|---|
| Pilbara Demersal Scalefish Fishery – Line | ✓ | ✓ | **Description:** The PLF encompasses all of the 'Pilbara waters', extending from a line commencing at the intersection of 21°56'S latitude and the boundary of the Australian Fishing Zone and north to longitude 120°E (Newman *et al.*, 2014). The PLF targets tropical demersal scalefish and is the smallest scale fishery within the PDSF in terms of monetary value, attaining a commercial catch of 40 t (Newman *et al.,* 2015b). There are no stated depth limits and the western extent of the fishery is the boundary of the AFZ (Newman *et al.*, 2015b). The PLF is managed under the Prohibition on Fishing by Line from Fishing Boats (Pilbara Waters) Order 2006 with the exemption of nine fishing vessels for any nominated five-month block period within the year. Fishing in Area 3 has also been a closed to line fishing since 1998 (Newman *et al.*, 2015b).<br>Records show there has been up to five active PLF vessels that operate within both the 10 NM and 60 NM blocks that cover WA-25-L and have operated there within the past four years (Gaughan *et al*., 2019). The fishing vessels have primarily targeted goldband snapper. |
| Pilbara Demersal Scalefish Fishery – Trap | ✓ | ✓ | **Description:** The PTMF covers the area from Exmouth northwards and eastwards to the 120° line of longitude, and offshore as far as the 200 m isobath. Like the trawl fishery, the trap fishery is also managed by the use of input controls in the form of individual transferable effort allocations monitored with a satellite-based vessel monitoring system (VMS). Waters inside of the 50 m isobath are permanently closed to trap fishing and Area 3 has also been closed to trapping since 1998 (Newman *et al.*, 2015b). Traps are limited in number with the greatest effort in waters greater than 50 m depth. This fishery targets high value species such as red emperor and goldband snapper (Newman *et al.*, 2019).<br>Records show that over the past four years, less than three active PFMF vessels have been in operation annually within both the 10 and 60 NM blocks that cover WA-25-L (Gaughan *et al*., 2019. |
| Pilbara Demersal Scalefish Fishery – Trawl | × | × | **Description:** The PFTIMF is divided into two zones and waters inside of the 50 m isobath are permanently closed to fish trawling. WA-25-L is located within Zone 1, which has been closed to fish trawling since 1998 (Gaughan *et al*., 2019). Only if this fishery was to reopen would there be any potential for interaction.<br>The PFTIMF operates with standard stern trawling gear (single net with extension sweeps). Records show that there are currently two active vessels in the trawl sector, which would be operating in Zone 2 (Gaughan *et al.*, 2019). |

| Fishery | Licensed to fish in WA-25-L | Potential for interaction | Description |
|---|---|---|---|
| Marine Aquarium Managed Fishery | ✓ | × | **Description:** The Marine Aquarium Managed Fishery operates within Western Australian waters. The managed fishery boundary lies within the WA-25-L. The fishery is primarily a dive-based fishery that uses hand-held nets to capture the desired target species and is restricted to safe diving depths (typically < 30 m). The fishery is typically active from Esperance to Broome, with popular areas including the coastal waters of the Cape Leeuwin/Cape Naturaliste region, Dampier and Exmouth.<br>The landed catch was predominantly ornamental fish but also included hermit crabs, seahorses, invertebrates, corals and live rock (Newman *et al.*, 2014).<br>The fishery has not been active in the WA-25-L within the last five years (Gaughan *et al*., 2019). Water depths in WA-25-L are not conducive for this fishery.<br>**Licences/vessels:** 11 licences in 2017/18 (Gaughan *et al*., 2019; Newman *et al.*, 2018). |
| Specimen Shell Managed Fishery | ✓ | × | **Description:** The Specimen Shell Managed Fishery can be conducted anywhere within Western Australia waters and targets the collection of specimen shells for display, collection, cataloguing and sale. The Specimen Shell Managed Fishery encompasses the entire WA coastline but effort is concentrated in areas adjacent to the largest population centres such as: Broome, Karratha, Shark Bay, Mandurah, Exmouth, Capes area, Albany and Perth (Hart and Crowe, 2015).<br>Collection is predominately by hand when diving or wading in shallow, coastal waters though a deeper water collection aspect to the fishery has been initiated with the employment of ROVs operating at depths up to 300 m (Hart *et al*., 2018). The fishery encompasses the entire WA coastline but effort is concentrated in area adjacent to the largest population centres such as: Broome, Karratha, Shark Bay, Mandurah, Exmouth, Capes area, Albany and Perth (Hart *et al*., 2018).<br>The fishery has not been active in the WA-25-L within the last five years (Gaughan *et al*., 2019). Water depths in WA-25-L are not conducive for this fishery.<br>**Licences/vessels:** 31 licences in 2017/18, with 23 of these being active in 2017 (Hart *et al.*, 2018c). |

| Fishery | Licensed to fish in WA-25-L | Potential for interaction | Description |
|---|---|---|---|
| Onslow Prawn Managed Fishery | ✓ | × | **Description**: The Onslow Prawn Managed Fishery encompasses a portion of the continental shelf off the Pilbara. The fishery targets a range of penaeids (primarily king prawns) which typically inhabit soft sediments < 45 m water depth. Fishing is carried out using trawl gear over unconsolidated sediments (sand and mud). Total prawn catches in 2016 were approximately three tonnes, considerably lower than other prawn fisheries (total north coast prawn landings in 2016 were 175 tonnes) (Kangas *et al.*, 2018).<br>The fishery has not been active in the WA-25-L within the last five years (Gaughan *et al*., 2019). Water depths in WA-25-L are not conducive for this fishery.<br>**Licences/vessels**: 30 licences in 2017/18 (Gaughan *et al*., 2019), one vessel in 2017 (Kangas *et al.* 2019). |
| Pearl Oyster Managed Fishery | ✓ | × | **Description:** The Western Australian Pearl Oyster Fishery is the only remaining significant wild-stock fishery for pearl oysters in the world. Pearl oysters (Pinctada maxima) are collected by divers in shallow coastal waters (> 23 m) along the North West Shelf and Kimberley, which are mainly for use in the culture of pearls (Hart *et al.,* 2018).<br>The fishery has not been active in the WA-25-L within the last five years (Gaughan *et al*., 2019). Water depths in WA-25-L are not conducive for this fishery.<br>**Licences/vessels**: 19,699 diver hours (Hart *et al.,* 2018). |
| West Australian Abalone Fishery | ✓ | × | **Description**: The Western Australian abalone fishery includes all coastal waters from the Western Australian and South Australian border to the Western Australian and Northern Territory border. The fishery is concentrated on the south coast (greenlip and brownlip abalone) and the west coast (Roe's abalone). Abalone are harvested by divers, limiting the fishery to shallow waters (typically < 30 m). No commercial fishing for abalone north of Moore River (Zone 8 of the managed fishery) has taken place since 2011–2012 (Strain *et al.*, 2018); interactions with participants in the fishery will not occur during the Petroleum Activities Program.<br>The fishery has not been active in the WA-25-L within the last five years (Gaughan *et al*., 2019). Water depths in WA-25-L are not conducive for this fishery.<br>**Licences/vessels:** 22 vessels active in Roe's abalone fishery (Strain *et al.,* 2018). |

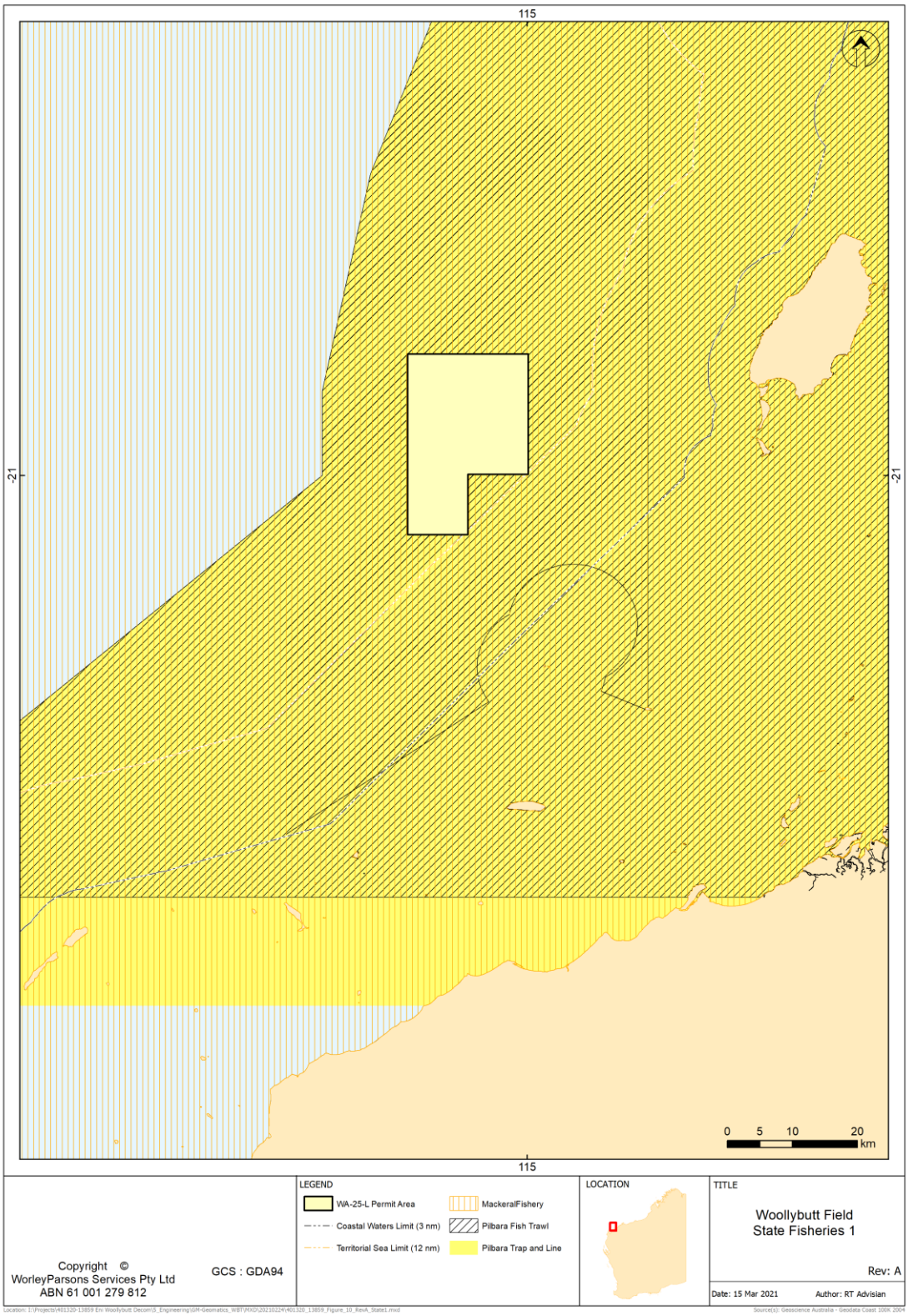



**Figure 4-10: Mackeral, Pilbara trawl, Pilbara line and Pilbara trap fisheries within the ZPI**

### 4.4.4 Tourism and Recreational Fishing

There are no tourism operations within the Operational Area. Tourism may occur in the ZPI, in particular around Barrow/Montebello islands, Muiron Islands and the Ningaloo coast. Most popular marine tourism activities include recreational fishing and diving/snorkelling. Ningaloo is the most significant area in the NWS region for nature-based tourism. Popular activities around Ningaloo include swimming with whale sharks and manta rays and snorkelling scuba diving along the Ningaloo Reef. Ningaloo Reef is closely adjoined by Cape Range National Park, a significant area for land-based tourism such as bushwalking. Occasional tourist and fishing charter vessels may however pass through the ZPI in transit between Exmouth and the Montebello Islands.

Recreational fishing mainly occurs near coastal islands including Thevenard Island located approximately 40 km south of the Operational Area and which lies within the ZPI. No recreational fishing is known to occur in the deep waters of the Operational Area.

### 4.4.5 Commercial Shipping

The Operational Area is located inshore of major shipping lanes between Australia and Asia. The closest major ports to the field are Dampier and Port Hedland to the north-east of the field.

Figure 4-11 shows historical AIS traffic plots. Vessel point density analysis conducted by AMSA indicates that the Operational Area is located outside of local shipping lanes of the North West Shelf, and vessel density in the vicinity of the field is low. It is possible that transient shipping traffic may occur albeit in low volumes.

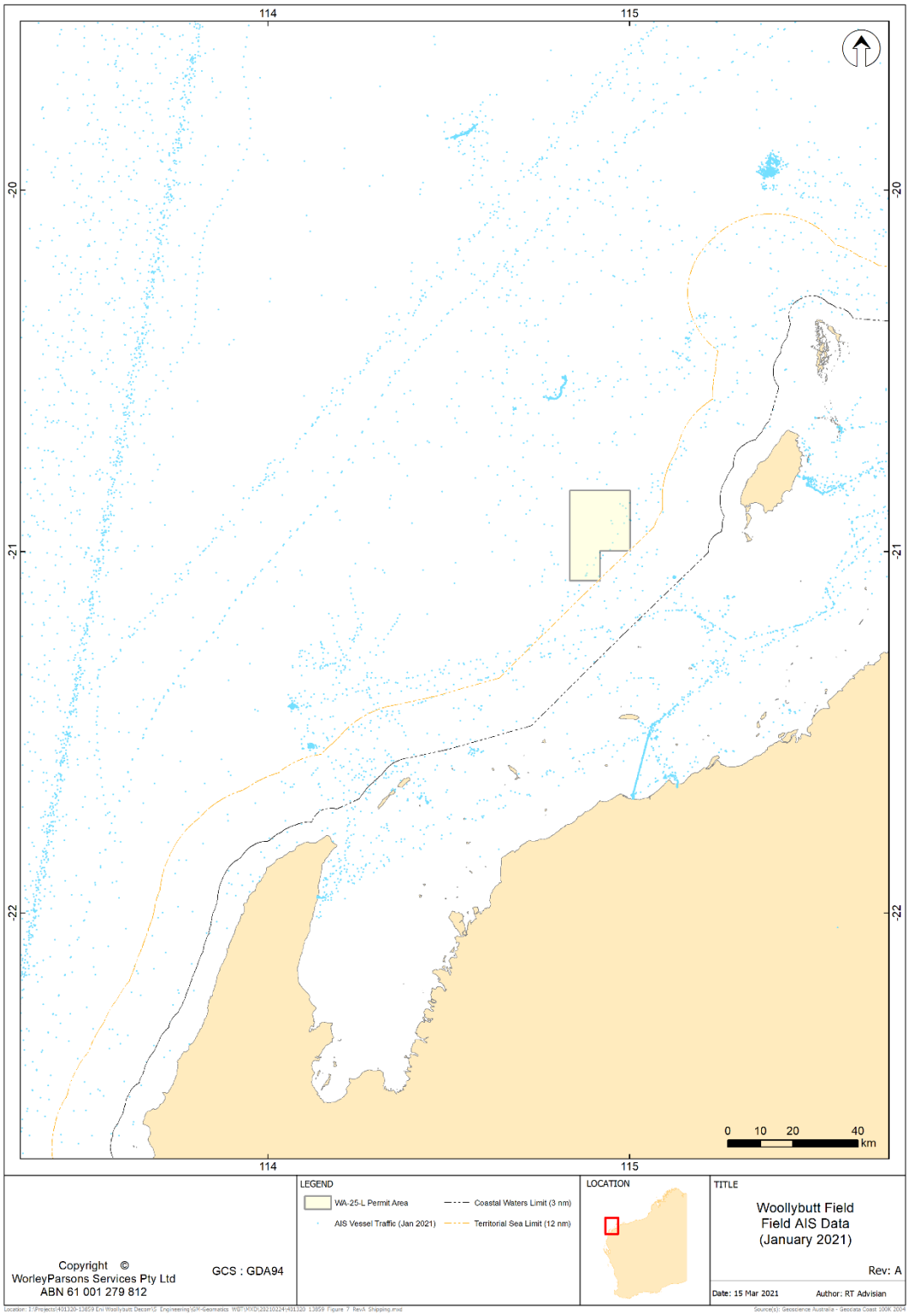



**Figure 4-11: Map showing the Operational Area in relation to shipping routes (January 2021)**

### 4.4.6 Defence Activities

The field exists within Sectors R852A and R852B of the North West Australia Exercise Area, a Defence Practice Area. Each of these is declared as a military flying training area activated by Notice to Airmen, existing in height blocks from 10,000 ft to 28,000 ft and 28,000 ft to 60,000 ft, respectively.

There are nearby ordnance sea dumping locations, at the reported position of 21° 23' 00" S, 114° 37' 00" E, where 'cartridges' were dumped in 183 m of water in 1969, and the disposal of unrecorded quantities of unexploded depth charges at 20° 23' 02" S, 115° 39' 57" E and 21° 29' 00" S, 114° 39' 42" E (Plunkett 2003). The nearest of these reported locations from Woollybutt is the site where cartridges were dumped, which is about 34 nm (61 km) from the nominated Woollybutt disposal datum. Of the two depth charge disposal sites, the latter is the closest to Woollybutt, at a distance of around 38 nm (68 km) from Woollybutt.

### 4.4.7 Oil and Gas Activities

The NWS is a well-developed petroleum region, supporting a large number of operating oil and gas fields, along with a number of proposed developments under construction and exploration and appraisal of prospective areas.

The Operational Area is located approximately 35 km west of Barrow Island, where Chevron Australia has been producing oil since 1967, with facilities on the island currently undergoing expansion associated with the Gorgon Project. The field is also located approximately 40 km south of the Gorgon gas fields, and approximately 25 km south-east of the nearest exploration well, Zola-1, which was completed in 2011.

The Chevron-operated Wheatstone pipeline lies within WA-25-L, approximately 1.5 km and 1.3 km to the west of the WB-4 and WB-5A well locations, respectively. The pipeline location with respect to WA-25-L is shown in Figure 4-12.

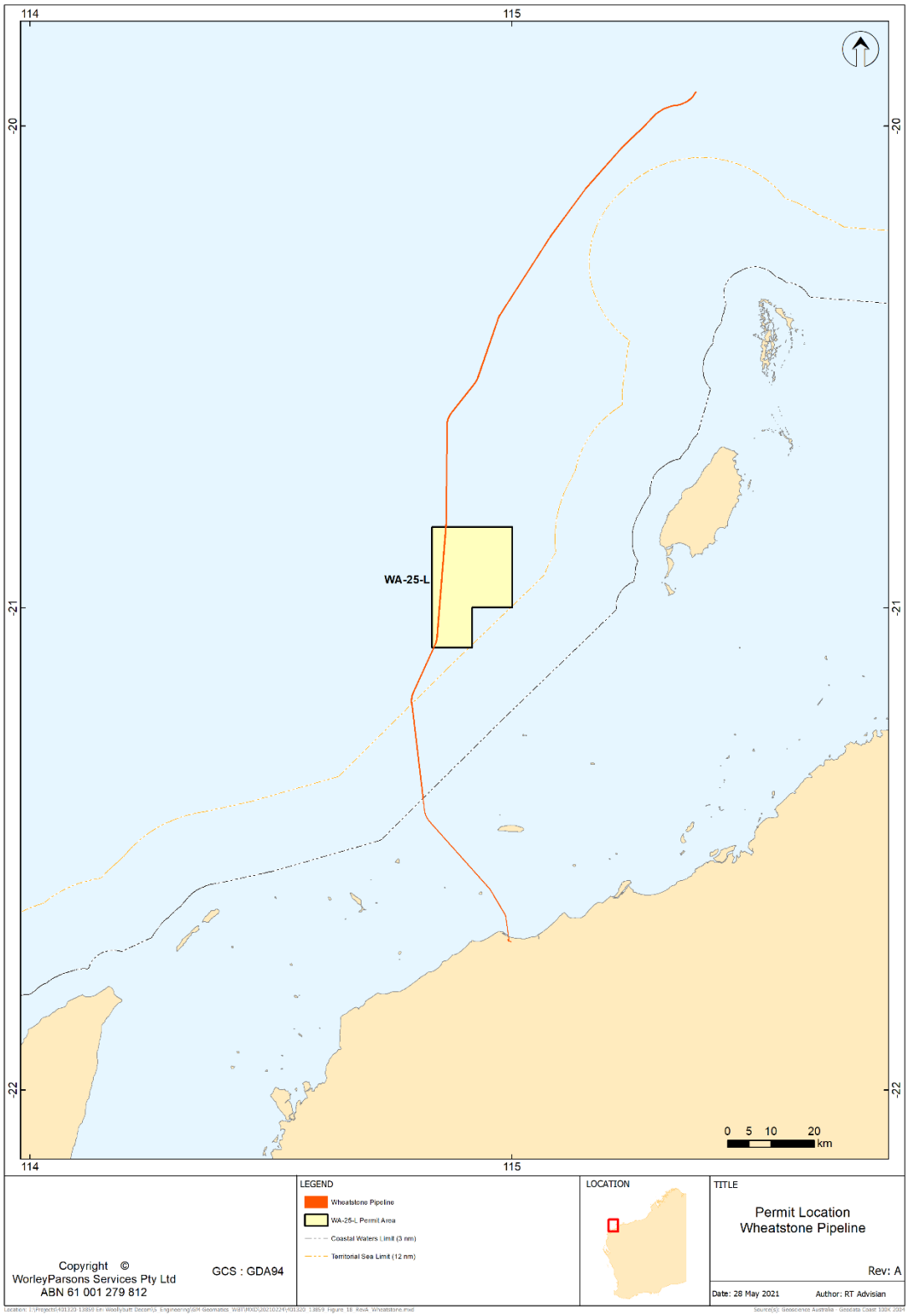



**Figure 4-12: Map showing the Wheatstone pipeline with respect to WA-25-L**

### 4.4.8 Cultural Heritage and Shipwrecks

Neither shipwrecks nor heritage sites are known to occur within the Operational Area (Commonwealth of Australia, 2012). The nearest shipwreck is the English ship *Tryal,* located approximately 100 km north-east of the Operational Area and ZPI, which was wrecked on what are now known as the Tryal Rocks just north of the Montebello Islands in 1622. This shipwreck is protected by the *Marine Archaeological Act 1973* and has 'National Estate' status.

A further uncharted wreck (the 19th Century ship *Wild Wave*) is understood to be located on the seaward side of the southwest section of the Montebello's barrier reef. Two other wrecks, one believed to be of a lugger wrecked about 1915 and one of a more recent vessel, are reported in or near the vicinity of Willy Nilly Lagoon in the central part of the Montebello Islands.

A number of World Heritage Areas, National and Commonwealth Heritage Places are located within the ZPI. These are further described in Section 4.5.

## 4.5 Values and Sensitivities

There are a number of key sensitive areas that overlap the Operational Area and/or ZPI. These are summarised in Table 4-6 and further described in Appendix C.

**Table 4-6: Key sensitive areas within Operational Area and/or ZPI**

| Key sensitive area | IUCN category* | Overlaps Operational Area | Distance from Operational Area (km) |
|---|---|---|---|
| **World Heritage Areas** | | | |
| Ningaloo Coast | Not applicable | No | 72 |
| Ningaloo Coast | Not applicable | No | 72 |
| Ningaloo Marine Area – Commonwealth Waters | Not applicable | No | 91 |
| **Wetlands of International or National Significance** | | | |
| None present within the Operational Area or ZPI | | | |
| **Australian Marine Parks (AMP)** | | | |
| Gascoyne AMP | IV (II, IV and VI)** | No | 109 |
| Ningaloo AMP | IV (II and IV)** | No | 91 |
| Montebello AMP | VI (VI)** | No | 26 |
| Shark Bay AMP | VI (VI)** | No | 400 |
| **State Marine Protected Areas** | | | |
| *Marine Parks* | | | |
| Ningaloo | IA, II and IV | No | 91 |
| Barrow Island | IA, IV/MODU and VI | No | 31 |
| Montebello Islands | IA, II, IV and VI | No | 55 |
| *Marine Management Areas* | | | |
| Muiron Islands | IA and VI | No | 72 |
| Barrow Island | IV and VI | No | 26 |
| **Key Ecological Features** | | | |
| Ancient coastline at 125 m depth contour | Not applicable | Yes | 0 |
| Continental Slope Demersal Fish Communities | Not applicable | No | 10 |
| Canyons Linking the Cuvier Abyssal Plain and the Cape Range Peninsula | Not applicable | No | 44 |
| Commonwealth Waters adjacent to Ningaloo Reef | Not applicable | No | 91 |

* IUCN categories and objectives:

- IA: Strict nature reserve – To conserve regionally, nationally or globally outstanding ecosystems, species (occurrences or aggregations) and/or geodiversity features: these attributes will have been formed mostly or entirely by non-human forces and will be degraded or destroyed when subjected to all but very light human impact.

- II: National park – To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation.
- IV: Habitat/species management area – To maintain, conserve and restore species and habitats.
- VI: Protected area with sustainable use of natural resources – To protect natural ecosystems and use natural resources sustainably, when conservation and sustainable use can be mutually beneficial.

** IUCN category for the Australian Marine Park is 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

### 4.5.1 Australian Marine Parks

The Operational Area does not overlap with any Australian Marine Parks (AMP), although four occur within the ZPI; Gascoyne AMP, Ningaloo AMP, Shark Bay AMP and Montebello AMP (Figure 4-13).

Details of the values of the AMPs is provided in Appendix C.

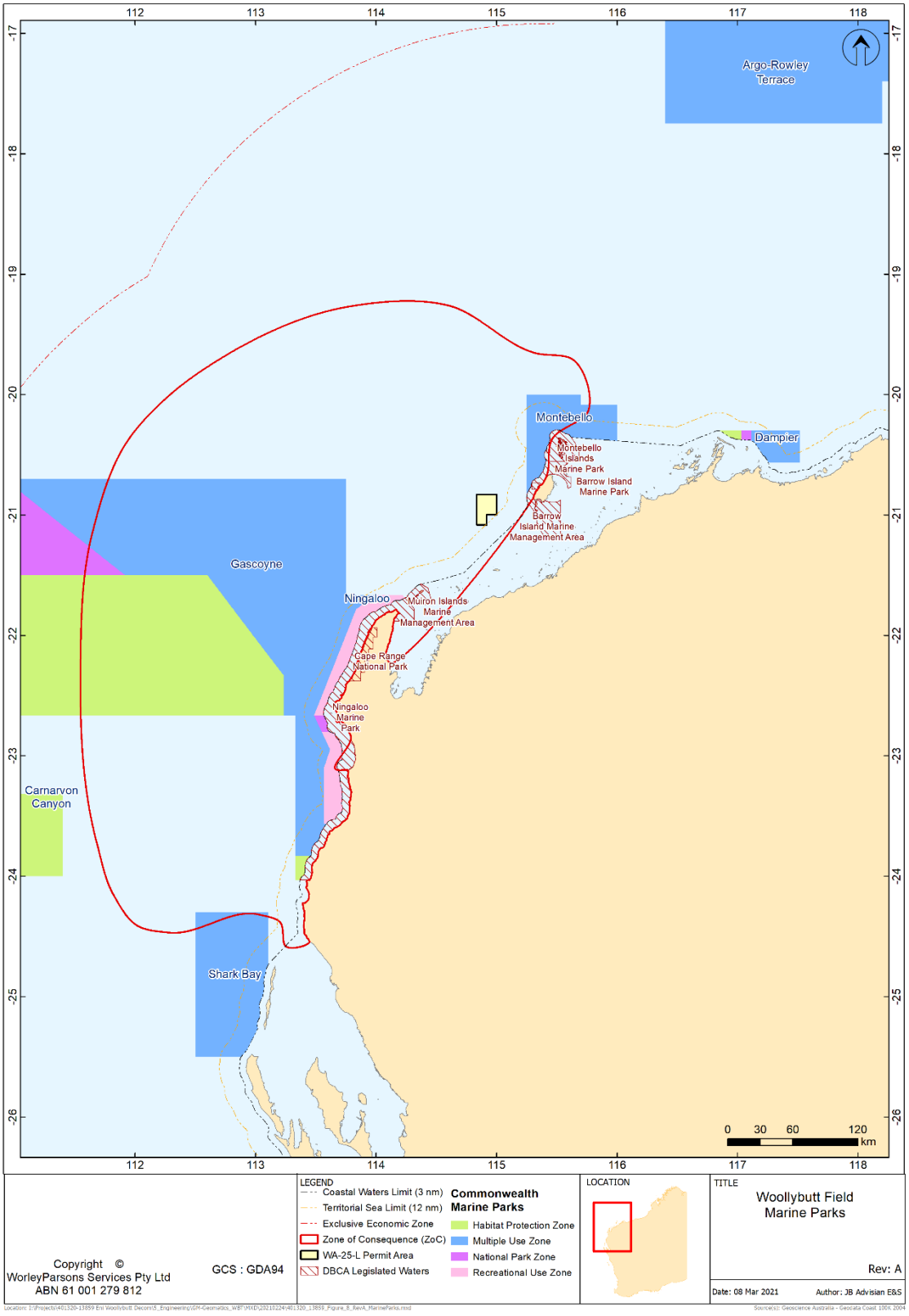



**Figure 4-13: Australian Marine Parks in the vicinity of the ZPI**

### 4.5.2 State Marine Protected Areas

No State-managed Marine Parks occur within the Operational Area. Two suites of conservation areas occur within the ZPI; the Ningaloo Marine Park and Muiron Islands Marine Management Area, and the Barrow Island Marine Park/Marine Management Area and Montebello Marine Park.

### 4.5.3 Key Ecological Features

An EPBC Protected Matters Search shows that the Operational Area contains one Key Ecological Feature (KEF) with an additional three within the ZPI which have been identified in the North-West Marine Bioregional Plan (Commonwealth of Australia, 2012). Under section 176 of the EPBC Act, once a bioregional plan has been made the minister responsible for the environment must have regard to it when making any decision under the Act to which the plan is relevant (DoEE, 2019).

The KEFs identified and shown in Figure 4-14 are:

- Ancient Coastline at 125 m depth contour (within Operational Area)
- Continental Slope demersal fish communities (within ZPI, 15 km to west of Operational Area)
- canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (within ZPI, 45 km to south west of Operational Area)
- Commonwealth waters adjacent to Ningaloo Reef (within ZPI, 110 km to south west of Operational Area).
- Exmouth Plateau (within ZPI, 90 km west of Operational Area).

These KEF communities are described in Appendix C.

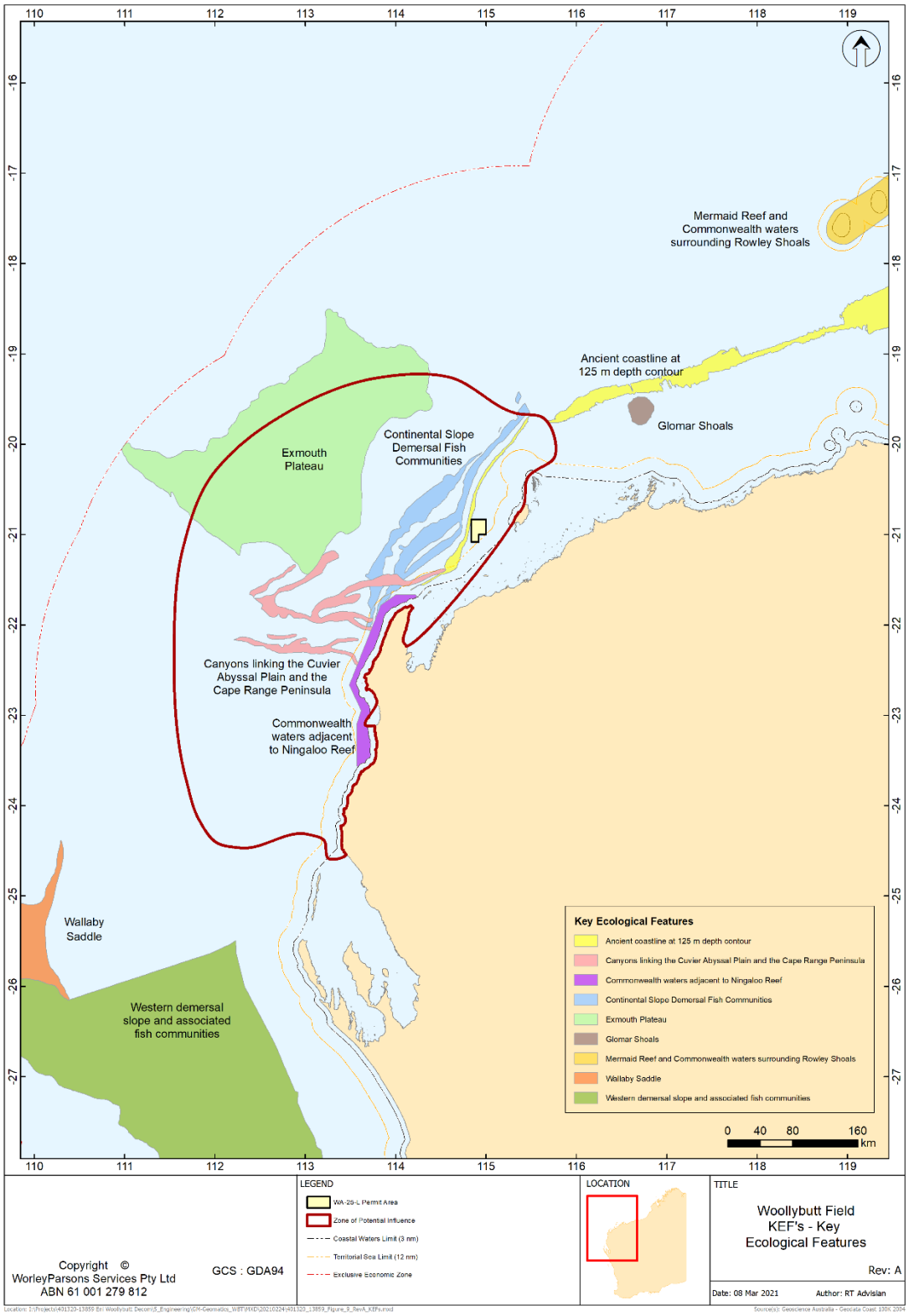



**Figure 4-14: Key ecological features in the vicinity of the ZPI**

# 5 STAKEHOLDER CONSULTATION

## 5.1 Consultation Summary

In accordance with Regulation 16 of the OPGGS(E) Regulations, the EP must contain:

"b) a report on all consultations between the titleholder and any relevant person, for regulation 11A, that contains:

- a summary of each response made by a relevant person; and
- an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates; and
- a statement of the titleholder's response, or proposed response, if any, to each objection or claim; and"

Eni has undertaken petroleum activities in the Woollybutt field since 2002, therefore Eni considers stakeholders, including marine users, well-informed regarding the location of the field and associated infrastructure. Consultation for the Woollybutt Field activities have been extensive over the lifecycle of the field.

Eni has consulted with relevant stakeholders regarding planned field management, P&A and equipment removal activities, regularly as part of larger scale consultation regarding the Woollybutt Field activities (see Section 5.3).

Eni has allowed each relevant person a reasonable period for assessing consultation material provided. No concerns or objections were received from stakeholders in relation to the proposed field management, P&A or equipment removal activities detailed within this EP.

Eni concludes all relevant stakeholders have been well informed of upcoming activities in the Woollybutt field through ongoing discussions regarding field management and P&A activities as evidenced in Appendix D.

## 5.2 Identification of Relevant Stakeholders

In identifying relevant persons, hereafter referred to as stakeholders, Eni gave consideration to the following categories:

- Each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant.
- Each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment 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 environment plan.

- Any other person or organisation that the titleholder considers relevant.

Relevant stakeholders are summarised in Table 5-1.

**Table 5-1: Relevant authorities, persons and organisations for consultation**

| Relevant Authority, Person or Organisation | Justification |
|---|---|
| **Commonwealth Federal Government** | |
| Australian Fisheries Management Authority (AFMA) | AFMA is the Australian Government agency responsible for the efficient management and sustainable use of Commonwealth fish resources. |
| Australian Hydrographic Service (AHS) (now Australian Hydrographic Office AHO) | The AHS is the Commonwealth Government agency responsible for the publication and distribution of nautical charts and other information required for the safety of ships navigating in Australian waters. |
| Australian Maritime Safety Authority (AMSA) | AMSA is the national maritime agency whose responsibilities include protecting the marine environment from the impacts of shipping. |
| Department of Agriculture, Water and the Environment (DoAWE) | Implements the Australian Government's policies and programmes to protect and conserve the environment, water and heritage and promote climate action.<br>In February 2015 environmental approvals were streamlined with NOPSEMA becoming the sole assessor for offshore petroleum activities. |
| Director of National Parks | The Director of National Parks is a corporation established under the *Environment Protection and Biodiversity Conservation Act 1999*. Parks Australia supports the Director of National Parks, the federal park agency, in managing six Commonwealth national parks, the Australian National Botanic Gardens, and Australia's network of Commonwealth marine reserves. |
| Department of Defence (DoD) | The Australian Defence Force (ADF) is constituted under the *Defence Act 1903*, its mission is to defend Australia and its national interests. In fulfilling this mission, Defence serves the Government of the day and is accountable to the Commonwealth Parliament which represents the Australian people to efficiently and effectively carry out the Government's defence policy. |
| **Western Australia State Government** | |
| Department of Mine, Industry Regulation and Safety (formerly Department of Mines and Petroleum) (DMIRS) | Responsible for ensuring the State's resources sector is developed and managed responsibly and sustainably for the benefit of all Western Australians. Prior to NOPSEMA it was the Designated Authority for adjacent Commonwealth Waters. |
| Department of Primary Industries and Regional Development (formerly Department of Fisheries) (DPIRD) | Conserve, develop & manage WA aquatic resources; commercial & recreational. fishing licencing; protecting aquatic environment & fish ecosystems. |
| Department of Biodiversity, Conservation and Attractions (DBCA) | Conserve Western Australia's biodiversity, cultural and natural values and providing world-recognised nature-based tourism and recreation experiences for the community. Includes the Parks and Wildlife Service. |
| Department of Transport (DoT) | Provides support in the event of a marine oil spill reaching State waters. |

| Relevant Authority, Person or Organisation | Justification |
|---|---|
| **Fishing Industry** | |
| Austral Fisheries | Commercial fishing company. |
| Commonwealth Fisheries Association (CFA) | Industry NGO – Peak body representing the collective rights, responsibilities and interests of commercial fishing industry in Commonwealth regulated fisheries. |
| Kailis Bros. | Fishing operator in the area holding 8 out of the 11 licences in the Pilbara Trawl Fishery; 1 out of 6 licences in the Pilbara Trap Fishery and 11 out of 30 licences in the Onslow Prawn Fishery. |
| A Raptis and Sons | Owns and operates 15 commercial fishing vessels that work out of the Northern Prawn Fishery, the Gulf of Carpentaria Developmental Finfish Trawl Fishery, the Gulf of Saint Vincent and the Great Australian Bight Trawl Fishery as well as participating in many international fishing operations. |
| Pearl Producers Association | The PPA promotes the economic, social and environmental importance of the Australian pearling industry to key decision makers and the wider community; formulating responses to issues that affect its members, and assisting with the provision of strategic direction in support of Australian South Sea Pearl Producers. |
| Recfishwest | Industry NGO – Peak recreational fishing body and advocate for fisheries. |
| Western Australian Fishing Industry Council (WAFIC) | WA Fishing Industry Council is Western Australia's peak industry body representing the interests of commercial fishing, pearling and aquaculture sectors. |
| Westmore Seafoods (Seafresh Holdings) | Fishing operator in the area holding 3 out of the 12 licences in the Pilbara Trawl Fishery; 0 out of 6 licences in the Pilbara Trap Fishery and 1 out of 30 licences in the Onslow Prawn Fishery. |
| Southern Blue Fin Tuna Industry Association (SBFTIA) | WAFIC recommended consultation with Southern Blue Fin Tuna Industry Association as WA is an important migratory route for Southern Blue Fin Tuna. |
| Individual Commercial Licence Holders | • Mackerel Managed Fishery<br>• Onslow Prawn Fishery<br>• Pilbara Trawl Fishery<br>• Pilbara Line Fishery<br>• Pilbara Trap Fishery. |
| Commonwealth Western Tuna and Billfish Fishery<br>• Ocean Wild Tuna | There is one active licence holder in the Western Tuna and Billfish Fishery. |
| **Oil and Gas Industry** | |
| Chevron | Chevron operates the Wheatstone pipeline which lies within WA-25-L, approximately 1.5 km and 1.3 km to the west of the WB-4 and WB-5A well locations, respectively. |

## 5.3 Consultation Undertaken

Eni has undertaken stakeholder consultation with regard to proposed field management and P&A activities in June 2015 and updated relevant stakeholders in 2016, 2018 and 2019. This consultation noted the 'field will be monitored on an ongoing basis using satellite monitoring and periodic in-field visual surveys until P&A activities are complete'.

The 2019 consultation presented the option of performing P&A with a MODU. No concerns were received from stakeholders in relation to the proposed field Petroleum Activities Program at the time.

Further consultation was undertaken with stakeholders in September 2020, in regard to the Woollybutt field status, ongoing field management and the proposed P&A of wells and removal of subsea equipment.

During March-May 2021, stakeholders were consulted on the proposed decommissioning of the Corkybark-1 wellhead. Stakeholders were advised of the proposed leave in-situ strategy for the Corkybark-1, wellhead (part of the petroleum activity under this EP) and also the future decommissioning of the remaining infrastructure in the Woollybutt field, which is covered under a separate EP submission (refer Section 3.4.4).

Full transcripts of consultation undertaken in relation to the Petroleum Activities presented in this EP and responses received is provided in Appendix D and a summary and assessment of consultation undertaken is shown in Table 5-2.

All feedback from consultation is evidenced in Appendix D and a summary is shown in Table 5-2.

**Table 5-2: Consultation summary and assessment**

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| AFMA | 24.05.2021 – Follow up email sent to AFMA<br>04.05.2021 – Follow up email sent to AFMA<br>25.03.2021 – Consultation email sent<br>25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent<br>11.03.2019 – Consultation letter (HSE.LT.5427.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5112.AFMA.TC) sent<br>21.07.2015 – Updated consultation letter (OPS.LT.3869.AFMA.RR) emailed and sent by post<br>01.09.2015 – Follow up email sent<br>01.09.2015 – Response received regarding removal of subsea equipment.<br>06.09.2016 – Letter (OPS.LT.4588.AFMA.TC) emailed and sent by post | • AFMA's clear preference is for all subsea equipment be removed to minimise the prospect of interference with fishing gear especially trawl gear.<br>• Request that industry operators in the area are consulted as part of the decommissioning process.<br>• No feedback was received in relation to P&A activities. | No Commonwealth Trawl Fisheries overlap the Operational Area.<br>Eni has consulted with industry operators through WAFIC and DPIRD Fisheries regarding potential impacts on WA trawl fisheries.<br>The decommissioning options assessment (Section 3.5.1.4) has determined that for Corkybark-1 wellhead the leave in-situ option delivers equal or better environmental, safety and well integrity outcomes compared to complete removal option. Therefore, leave in-situ is proposed for the Corkybark-1 wellhead.<br>Eni will continue conversations with AFMA when developing future decommissioning approvals. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| AHO (previously AHS) | 25.03.2021 – Consultation email sent<br>25.09.2020 – Email received from AHO<br>25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent<br>07.05.2018 – Email received<br>04.05.2018 – Email updated<br>04.05.2018 – Consultation email<br>0.1.05.2018 – Consultation letter (OPS.LT.5113.AHO.TC) sent<br>12.05.15 – Sent consultation letter<br>06.09.2016 – Letter (OPS.LT.4589.AHO.TC) emailed and sent by post<br>07.09.2016 – Email/letter received | AHO acknowledged receipt of information but did not provide any feedback. | No response required. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| AMSA | 25.03.2021 – Consultation email sent<br>25.09.2020 – Email received from AMSA<br>25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent<br>13.03.2019 – Reply received<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent<br>09.05.2018 – Reply received<br>04.05.2018 – Consultation email<br>01.05.2018 – Consultation letter (OPS.LT.5114.AMSA.TC) sent<br>06.09.2016 – Letter (OPS.LT.4590.AMSA.TC) emailed and sent by post | AMSA provided the following guidance:<br>• The AHO should be contacted no less than four working weeks before operations commence for the promulgation of notices to mariners.<br>• IV/MODU to notify AMSA's Joint Rescue Coordination Centre (JRCC) for promulgation of radio-navigation warnings at each of the plug and abandonment sites, 24-48 hours before operations commence.<br>AMSA provided further feedback in March 2019 following provision of an updated activity description:<br>• AMSA provided vessel traffic plots providing up to date information on vehicle traffic in the area.<br>• AMSA reiterated their notification requirements previously provided in May 2018. | Eni will ensure AHO and AMSA is notified in accordance with relevant communication procedures (see Section 10.8). |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| DBCA (previously DPAW) | 25.03.2021 – Consultation email sent<br>02.10.2020 – Email response received from DBCA<br>25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5116.DBCA.TC) sent<br>06.09.2016 – Letter (OPS.LT.4605.DPAW.TC) emailed and sent by post | In response received on 02.10.2020, DBCA stated there are a number of ecologically important areas including marine parks and island/coastal conservation reserves located in the vicinity of the proposed operations, including the Barrow Island Marine Park.<br>DBCA iterated the importance of appropriate baseline survey data on the important ecological values of these areas and any current contamination if present within the area of potential impact of spills (as identified through Eni's modelling.<br>DBCA encouraged Eni to ensure it attains all information required to implement a Before-After, Control-Impact (BACI) framework in planning its management response. This may include independently monitoring and collecting data where required or identifying other data sources.<br>In the event of a hydrocarbon release, it is requested that Eni notify DBCA's Pilbara regional office as soon as practicable on (08) 9182 2000 | Eni maintains the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) for the Woollybutt Petroleum Activities Program, which includes the requirement to contact DBCA in the event of a hydrocarbon release.<br>The Woollybutt Operational and Scientific Monitoring Plan includes details on surveys to be used for baseline in the event of a hydrocarbon release. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| DOD | 25.03.2021 – Consultation email sent<br>25.09.2020 – Consultation letter (OPS.LT.6230.SD) sent<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent<br>29.05.2018 – Reply received<br>04.05.2018 – Consultation email<br>01.05.2018 – Consultation letter (OPS.LT.5118.DOD.TC) sent<br>12.05.15 – Consultation letter sent<br>21.07.15 – Updated consultation letter emailed and sent by post<br>06.08.15 – Reply received from Cristopher Crowley – Project Officer<br>06.09.2016 – Letter (OPS.LT.4594.DOD.TC) emailed and sent by post | Department has responded to consultation noting no objection in relation to P&A activities DOD requested that the AHO be notified three weeks prior to the actual commencement of activities. | Eni will ensure AHO is notified in accordance with relevant communication procedures (see Section 10.8). |
| DoT | 25.03.2021 – Consultation email sent<br>05.10.2020 –Response received from DoT<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>1.05.2019 – Email sent<br>30.04.2019 – Email received<br>15.04.2019 – Email received<br>10.04.2019 – Email sent with further information<br>10.04.2019 – Email sent<br>10.04.2019 – Reply received<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent<br>07.08.2018– Reply received | DoT advice dated 05.10.2020 requested if there are any changes to the oil spill response arrangements or change in risk, please ensure DoT is consulted as outlined in the DoT Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020).<br>DoT advice dated 14.5.2018 requested that DoT be consulted in the event there is any risk of a spill impacting State waters from the proposed activities. Eni provided spill risk information (OPEP) on 24.5.2018.DoT advice dated 7.08.2018 outlined a comprehensive review of the OPEP and spill risk information has not been undertaken by DoT. This is partially due to the relatively lower risk of plugging and abandonment activities and the | Eni confirms the spill risk had not changed. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| | 14.06.2018 – Reply received<br>24.05.2018 – Spill risk information sent<br>14.05.2018 – Reply received<br>04.05.2018 – Consultation email<br>01.05.2018 – Consultation letter (OPS.LT.5126.DOT.TC) sent | offshore location of the activity. DoT requested the revised version of the OPEP be aligned with the current and any future revisions of the IGN and submitted once finalised.<br>DoT provided further advice on 30.4.2019 regarding shoreline response – DoT advised that DoT has shoreline response equipment in Dampier but is unable to provide equipment lists as these are subject to change without notice. As a L2/3 Controlling Agency, DoT will execute the response as per preplanning and resources conducted by the Titleholder and accepted by NOPSEMA. | |
| DoAWE | 22.03.21 – Meeting with Sea Dumping Section<br>16.03.21 – Feedback received from Sea Dumping Section<br>11.03.21 – Further information sent to the Sea Dumping Section and request for consultation regarding Sea Dumping Permit<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent<br>18.12.14 Consultation meeting<br>06.09.2016 – Letter (OPS.LT.4596.DOTE.TC) emailed and sent by post | Meeting with the Sea Dumping Section held in March 2021 confirmed the requirement for a Sea Dumping Permit for the insitu abandonment of the Corkybark-1 wellhead.<br>Meeting held in December 2014 discussed the transition of responsibilities from DotE to NOPSEMA for offshore petroleum activities. | Eni will continue to engage with the Sea Dumping Section as required with respect to Sea Dumping Permit applications. |
| DMIRS (formerly DMP) | 25.03.2021 – Consultation email sent<br>09.10. 2020 – Email response from DMIRS<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>06.05.2019 – Acknowledgement sent | • During the 2018 consultation DMIRS requested additional information on the receiving environment and potential impacts to State Waters and lands. Information on existing environment and spill modelling was provided on 7.6.2018. Considering spill modelling determined no | Eni commits to ongoing consultation and notification with DMIRS, including in the event of any incidents, for the Woollybutt Field in line with their Consultation Guidance. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| | 06.05.2019 – Reply received<br>09.04.2019 – Summary of spill modelling sent<br>04.04.2019 – Reply received<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent<br>08.06.2018 – Reply received<br>07.06.2018 – Eni response<br>30.05.2018 – Reply received<br>04.05.2018 – Consultation email<br>01.05.2018 – Consultation letter (OPS.LT.5117.Dmirs.TC) sent<br>06.09.2016 – Letter (OPS.LT.4593.DMP.TC) emailed and sent by post | contact to State Marine Protected Areas, DMIRS did not have any comments.<br>• DMIRS requested the EP contain a requirement for incident notification to DMIRS.<br>• In March 2019 consultation DMIRS requested Eni provide the updated spill modelling referred to in the correspondence, or a summary that is relevant to State waters/lands.<br>• In May 2019, DMIRS provided further advice regarding incident notification: to follow up verbal notification with written notification by email, and to use (08) 9222 3727 for notifying the Department of petroleum environment incidents.<br>• DMIRS notes that the proposed activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and NOPSEMA. DMIRS request Eni provide pre-start notifications confirming the start date of the proposed P&A and subsea equipment recovery executions, and subsequent cessation notifications to inform DMP upon completion of the activity, to petroleum.environment@dmirs.wa.gov.au. | A summary of oil spill modelling that is relevant to State waters/lands has been sent to DMIRS.<br>Notification requirements have been incorporated in the OPEP.<br>Pre-start notifications confirming the start date of the proposed P&A and subsea equipment recovery executions, and subsequent cessation notifications to inform will be sent to petroleum.environment@dmirs.wa.gov.au. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| DNP | 25.03.2021 – Consultation email sent<br>08.10.2020 – Response received from DNP<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>8.03.2019 – Consultation letter (HSE.LT.5415.STKH.TC) sent | Did not provide any feedback in relation to the proposed activities. However:<br>• provided notification details in the event of a spill<br>• iterated importance of including impacts to marine parks values in EP. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder.<br>Notification to DNP in event of a spill is included in the Woollybutt OPEP.<br>Impacts to marine park values have been assessed in the event of a spill (Section 8.5) |
| Austral Fisheries | 25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>14.03.19 – Email response received<br>11.03.19 – Consultation letter (HSE.LT.5427.STKH.TC) sent<br>21.07.15 – Updated consultation letter sent by post<br>21.07.15 – Received email response advising that the program was noted and did not pose any problems for Austral Fishing<br>06.09.2016 – Letter (OPS.LT.4591.Austral.TC) emailed and sent by post<br>06.09.2016 – Email from D Carter acknowledging Eni email | Austral Fisheries confirmed they had no concern with the proposed activity in consultation dated 21.7.15 and in February 2019. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder. Further consultation is determined not to be required on the subsea equipment removal scope as it is within the 500 m PSZ. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| DPIRD (fisheries) | 11.05.2021 – Meeting between Eni and DPIRD<br>25.03.2021 – Consultation email sent<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>11.03.19 – Consultation letter (HSE.LT.5426.STKH.TC) sent<br>29.05.2018 – Reply received<br>01.05.2018 – Consultation letter (OPS.LT.5119.DOF.TC) sent<br>12.05.15 – Consultation letter sent<br>21.07.15 – Updated consultation letter emailed and sent by post<br>27.07.15 – Reply received<br>13.08.15 – Eni responded to letter<br>06.09.2016 – Project update letter (OPS.LT.4595.DOF.TC) emailed and sent by post<br>28.09.16 – Email organising ongoing consultation<br>28.09.16 – Email response from DoF booking ongoing consultation | During a meeting with DPIRD on 11.05.2021, regarding the potential snag risk presented by abandonment of Corkybark-1 wellhead, DPIRD view is the snag risk is typically low based on the ongoing presence of the infrastructure on the seabed and technology used on trawl vessels for detecting and avoiding seabed obstacles. DPIRD prefer equipment to be marked on nautical charts and avoided by trawl vessels, rather than the use of over-trawlable structures, which could be subject to corrosion, movement and scouring. DPIRD confirmed a number of changes would be required for Pilbara Trawl Fishery Zone 1 to reopen, including amendment to the fishery management plan.<br>DPIRD advice dated 29.05.2018 stated they rely on the Regulator to ensure risks of impact on aquatic resources due to reduced water quality associated with the various cessation activities (P&A activities) are appropriately mitigated and managed.<br>DRIRD also requested to progress decommissioning as soon as practicable and communicate its preferred decommissioning option. DPIRD also provided advice on their preferences in terms of decommissioning.<br>DPIRD also provided feedback in 2015 in response to the proposed decommissioning activities proposed at the time. Key issues raised by DPIRD include fish spawning and aggregation times in the area, pollution emergency plans, biosecurity. | DPIRD advice received in May 2021 regarding snag risk and management has been incorporated in the assessment of Corkybark-1 decommissioning options (Section 3.5.1.4) and Section 7.1.2.3.<br>Potential for reduced water quality impacts and mitigation measures during P&A / cessation are discussed in Section 7.7.<br>Eni will continue conversations with DPIRD regarding the decommissioning options of subsea equipment as part of future approvals.<br>DoF's advice on decommissioning activities dated 27.07.15 has been used in the development of this EP. Eni has responded to consultation addressing each of these key issues, and updated relevant sections in the EP as follows:<br>• fish spawning and aggregation (Section 4)<br>• OPEP (Section 10)<br>• biosecurity (Section 8.1) |
| DPIRD (marine pests) | 25.09.20 – Consultation letter (OPS.LT.6230.SD) sent | DPIRD (marine pests) did not provide any feedback in relation to the proposed activities. | Marine pest managed is addressed in Section 8.1. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| Commonwealth Fisheries Association (CFA) | 25.03.2021 – Consultation email sent<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>11.03.19 – Consultation letter (HSE.LT.5427.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5115.Comfish.TC) sent<br>12.05.15 – Consultation letter sent<br>21.07.15 – Updated consultation letter emailed and sent by post<br>06.09.2016 – Letter (OPS.LT.4592.Comfish.TC) emailed and sent by post | CFA did not provide any feedback in relation to the proposed activities. | No response required. Impacts to Commonwealth Fisheries have been assessed in Section 7.1 and are considered minor. Appropriate management measures will be put in place to manage potential impacts (Section 9).<br>Subsea equipment removal scope is within the already in place 500 m PSZ. |
| Commonwealth Fisheries (Ocean Wild Tuna) | 04.04.19 – Consultation letter (HSE.LT.5427.STKH.TC) sent | No response at time of EP submission. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder.<br>Subsea equipment removal scope is within the already in place 500 m PSZ. |
| Kailis Bros. | 25.03.2021 – Consultation email sent<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>12.03.19 – Consultation letter (HSE.LT.5426.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5120.Kailis.TC) sent<br>21.07.15 – Consultation letter sent by post<br>21.07.15 – Received email response from Stephen Hood advising no issues<br>06.09.2016 – Letter (OPS.LT.4597.Kailis.TC) emailed and sent by post | Kailis confirmed it had no concern with the proposed activity in consultation dated 21.7.15. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder.<br>Subsea equipment removal scope is within the already in place 500 m PSZ. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| A Raptis and Sons | 25.03.2021 – Consultation email sent<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>11.03.19 – Consultation letter (HSE.LT.5426.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5122.Raptis.TC) sent<br>12.05.15 – Consultation letter sent<br>21.07.15 – Updated consultation letter emailed and sent by post<br>06.09.2016 – Letter (OPS.LT.4598.Raptis.TC) emailed and sent by post | A Raptis and Sons did not provide any feedback in relation to the proposed activities. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder.<br>Subsea equipment removal scope is within the already in place 500 m PSZ. |
| Recfishwest | 25.03.2021 – Consultation email sent<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>11.03.19 – Consultation letter (HSE.LT.5426.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5123.Recfish.TC) sent<br>12.05.15 – Consultation letter sent<br>21.07.15 – Updated consultation letter 3 emailed and sent by post<br>06.09.2016 – Letter (OPS.LT.4599.Recfish.TC) emailed and sent by post | Recfishwest did not provide any feedback in relation to the proposed activities. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder.<br>Subsea equipment removal scope is within the already in place 500 m PSZ. |
| Western Australian Fishing Industry Council (WAFIC) | 24.05.2021 – Draft minutes of meeting (13.05.2021) shared with WAFIC<br>19.05.2021 – Information received from WAFIC | In feedback received in March and May 2021, WAFIC requested to ensure trawl fishing can operate in the area in the future, and hence the base case preferred option is for total removal of wellheads and other infrastructure. | Licence holders and other relevant stakeholders as provided by WAFIC were consulted in regards to the proposed activities.<br>Future decommissioning options and activities will be assessed as part of a new |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| | 13.05.2021 – Meeting between Eni and WAFIC<br>16.03.2021 – Meeting between Eni and WAFIC<br>13.11.2020 – Email reply from WAFIC to Eni<br>13.11.2020 – Email reply from Eni to WAFIC<br>12.11.2020 – Email reply from WAFIC to Eni<br>09.10.2020 – Email reply from Eni to WAFIC<br>07.10.2020 – Email response received from WAFIC<br>07.10.2020 – Email reply from Eni to WAFIC<br>07.10.2020 – Phone conversation between Eni to WAFIC<br>05.10.2020 – Email reply from Eni to WAFIC<br>02.10.2020 – Email response received from WAFIC<br>25.09.20 - Consultation letter (OPS.LT.6230.SD) sent<br>12.03.19 – Reply received<br>11.03.19 – Consultation letter (HSE.LT.5426.STKH.TC and HSE.LT.5427.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5124.WAFIC.TC) sent<br>12.05.15 – Consultation letter sent<br>21.07.15 – Updated consultation letter emailed and sent by post22.07.2016 – Email to WAFIC for ongoing consultation<br>04.09.16 – Ongoing consultation response from WAFIC | In November 2020 WAFIC provided feedback that that Eni include words to the effect that ENI inductions for support vessels include a topic to reinforce the importance of marine communications regarding any potential interactions with active commercial fishing.<br>In responses in October 2020. WAFIC Iterated that as the Woollybutt Field Management and Plug and Abandonment EP activities are within the 500 PSZ then they have no interest. However will have interest in future decommissioning.<br>WAFIC provided feedback on the following in March 2019:<br>• Advice on improving material provided as part of the stakeholder consultation process<br>• Fisheries with a potential to be impacted and those unlikely to be impacted<br>• Licence holders and other relevant stakeholders to be consulted<br>• Potential concerns and opportunities that may arise from future decommissioning activities including the removal and/or leaving in place infrastructure. | EP and all relevant stakeholders will be reconsulted.<br>Subsea equipment removal scope is within the already in place 500m PSZ, therefore limiting interactions with commercial fisheries.<br>All wellheads will be removed with the exception of Corkybark which is proposed to be left insitu due to the technical challenges associated with its removal, following a prior unsuccessful attempt in 2000.<br>AHO will be consulted to ensure mark the wellhead is marked on nautical charts. The risk reducing potential of vessel automatic radar and nautical charts is considered high. Eni will not mandate an exclusion zone around Corkybark-1 wellhead to allow access to fishers.<br>The overall snag risk is determined to be low (Section 3.5.1.4, Section 7.1). In the rare event of snagging, the pulling force from snagged equipment is unlikely to be sufficient to cause the rollover of stern trawlers used in the Pilbara Trawl Fishery, due to the forces acting on the length axis of the vessel. Potential impacts of snagging would be expected to be minor and short term, based on interruption to fishing operations and damage to individual trawl equipment.<br>A commitment has been included in the Section 10.3.2 (Inductions) to reinforce the importance of marine communications |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| | 06.09.2016 – Project update letter (OPS.LT.4600.WAFIC.TC) emailed and sent by post<br>22.09.16 – Ongoing consultation email to WAFIC<br>27.09.16 – Ongoing consultation email from WAFIC | | regarding any potential interactions with active commercial fishing. |
| Westmore Seafoods (Seafresh Holdings) | 25.03.2021 – Consultation email sent<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>11.03.19 – Consultation letter (HSE.LT.5426.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5125.Westmore.TC) sent<br>21.07.15 – Updated consultation letter emailed and sent by post<br>06.09.2016 – Project update letter (OPS.LT.4601.Westmore.TC) emailed and sent by post | Westmore did not provide any feedback in relation to the proposed activities. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder. |
| Pearl Producers Association (PPA) | 25.03.2021 – Consultation email sent<br>25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>11.03.19 – Consultation letter (HSE.LT.5426.STKH.TC) sent<br>01.05.2018 – Consultation letter (OPS.LT.5121.PPA.TC) sent | PPA did not provide any feedback in relation to the proposed activities. | No response required. Given the nature of activities proposed under this EP, Eni expects no impact to this stakeholder. |
| Southern Blue Fin Tuna Industry Association (SBFTIA) | 11.03.19 – Consultation letter (HSE.LT.5427.STKH.TC) sent | SBFTIA did not provide any feedback in relation to the proposed activities. | No response required. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| Mackerel Managed Fishery | 25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>04.04.2019 – Consultation letter sent (HSE.LT.5415.STKH.TC updated)<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.1) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.4) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.6) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.8) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.10) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.11) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.12) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.13) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.14) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.17) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.18) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.19) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.22) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.23) sent | License holders have been kept well informed regarding activities in the Woollybutt Field in permit WA-25-L. No objection or concern has been raised by license holders in relation to P&A of field management activities.<br>No response at time of EP submission to 2020 consultation. | No response required. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| | 01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.24) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.27) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.28) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.29) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.31) sent<br>13.08.15 – Consultation notice sent to license holder<br>01.08.2016 – Letter and consultation notice sent to license holder | | |
| Onslow Prawn Fishery | 04.04.2019 – Consultation letter sent (HSE.LT.5415.STKH.TC updated)<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.2) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.3) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.5) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.15) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.25) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.26) sent<br>13.08.15 – Consultation notice sent to license holder<br>01.08.2016 – Letter and consultation notice sent to license holder | License holders have been kept well informed regarding activities in the Woollybutt Field in permit WA-25-L. No objection or concern has been raised by license holders in relation to P&A activities such as ROV surveys.<br>No response at time of EP submission to 2019 consultation. | No response required. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| Pilbara Trawl Fishery | 25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>04.04.2018 – Consultation letter sent (HSE.LT.5415.STKH.TC updated)<br>13.08.15 – Consultation notice sent to license holder<br>01.08.2016 – Letter and consultation notice sent to license holder | License holders have been kept well informed regarding activities in the Woollybutt Field in permit WA-25-L. No objection or concern has been raised by license holders in relation to P&A activities such as ROV surveys. | No response required. |
| Pilbara Line Fishery | 25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>04.04.2018 – Consultation letter sent (HSE.LT.5415.STKH.TC updated)<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.7) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.9) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.20) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.21) sent<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.30) sent<br>13.08.15 – Consultation notice sent to license holder<br>01.08.2016 – Letter and consultation notice sent to license holder | License holders have been kept well informed regarding activities in the Woollybutt Field in permit WA-25-L. No objection or concern has been raised by license holders in relation to P&A activities such as ROV surveys.<br>No response at time of EP submission to 2020 consultation. | No response required. |

| Stakeholder | Consultation Summary | Consultation Feedback summary | Eni response |
|---|---|---|---|
| Pilbara Trap Fishery | 25.09.20 – Consultation letter (OPS.LT.6230.SD) sent<br>04.04.2018 – Consultation letter sent (HSE.LT.5415.STKH.TC updated)<br>01.05.2018 – Consultation letter (OPS.LT.5111.CFLH.TC.16) sent<br>13.08.15 – Consultation notice sent to license holder<br>01.08.2016 – Letter and consultation notice sent to license holder | License holders have been kept well informed regarding activities in the Woollybutt Field in permit WA-25-L. No objection or concern has been raised by license holders in relation to P&A activities such as ROV surveys.<br>No response at time of EP submission to 2020 consultation. | No response required. |
| Chevron | 02.06.21 – Meeting with Chevron<br>28.05.21 – Consultation letter (OPS.LT.6457.SD) sent | At a meeting on 2 June 2021, Eni and Chevron agreed to each nominate a team to engage and cover relevant risks and mitigation measures relating to Woollybutt P&A activities in the vicinity of the Wheatstone pipeline. | Eni will continue to engage Chevron in relation to operational and emergency arrangements for ongoing operations in WA-25-L. |

## 5.4 Ongoing Consultation

Stakeholder consultation for the activities will be ongoing and Eni will work with stakeholders to address any future concerns if they arise throughout the duration of this EP. Should any new stakeholders be identified (see Section 5.1), they will be added to the stakeholder database and included in all future correspondence as required, including specific activity notifications.

Feedback gathered during the pre-activity consultation will inform stakeholder engagement requirements for ongoing consultation during the activity. Stakeholder Notification Letters will be distributed to stakeholders (who requested ongoing consultation). If additional comments do arise, four weeks allows Eni an appropriate amount of time to respond and address these comments.

Eni will continue to accept feedback from all stakeholders during the assessment of this EP and throughout the duration of the accepted EP.

Additional consultation with relevant stakeholders will occur in the event there is a significant change to the proposed activities.

# 6 ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

## 6.1 Risk Assessment

In accordance with Regulation 13(5), the EP must include:

(a) details of the environmental impacts and risks for the activity, and

(b) an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk, and

(c) details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level.

The Eni philosophy to manage environmental risks is to eliminate or mitigate the risk during the planning phase. Managing risks through design is contingent upon identifying, at an early stage in the project, the sources and pathways by which environmental impacts can occur and the sensitivities of the receiving environment in which the project is situated.

The expected or potential impacts associated with the Activity were assessed using the Eni procedure *Risk Management and Hazard Identification* (ENI-HSE-PR-001). This procedure is consistent with the Australian Standard for Risk Management: *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines* and provides a systematic process for:

1. identifying each project activity and its associated environmental aspects
2. identifying the environmental values within and adjacent to the area
3. defining the potential environmental effects (impacts) of aspects identified in Step 1 above on the values identified in Step 2 above
4. identifying the potential environmental consequences and severity of the impact (Table 6-2)
5. identifying the likelihood of occurrence of the consequence, according to a six-level scale (Table 6-1)
6. evaluating overall environmental risk levels using the Eni environmental risk matrix (Figure 6-1)
7. identifying mitigation measures, assigning management actions and further recommended risk reduction measures according to risk levels (Table 6-3) in order to reduce the risk to ALARP.

**Table 6-1: Likelihood scale**

| ID | Likelihood | Description |
|---|---|---|
| 0 | Non-credible | Theoretically possible but not known/reasonably expected to have occurred in the exploration and production industry. |
| (A) | Rare | Reported for exploration and production industry (Freq 10-6 to 10-4/years) |
| (B) | Unlikely | Has occurred at least once in Company (Freq 10-4 to 10-3/years) |
| (C) | Credible | Has occurred several times in Company (Freq 10-3 to 10-1/years) |
| (D) | Probable | Happens several times per year in Company (Freq 10-1 to 1/years) |
| (E) | Almost certain/ will occur | Several times per year at one location (Freq > 1/year) |

**Table 6-2: Environmental consequence descriptors**

| Descriptor | Description |
|---|---|
| (1) Slight | No stakeholder impact or temporary impact on the area.<br>Involved area < 0.1 sq. mile.<br>Spill < 1 m³ – no sensitive impact on ground.<br>Small discharges with confined and temporary impact on the area. No noticeable impact on water/air/soil and biodiversity. Negligible impact due to GHG emissions. Good materials/energy/water selection & use. Negligible financial consequences. |
| (2) Minor | Some local stakeholder concern or < 1 week for clean-up or 1 year for natural recovery or impact on small no. of not compromised species.<br>Involved area < 1 sq. mile.<br>Spill < 10 m³ – impact on localised ground.<br>Sufficiently large discharges to impact the environment, but no long lasting effect. Short term, localised impact on water/air/soil and biodiversity (on a limited no. of non-threatened species).<br>Slight impact due to greenhouse gas (GHG) emissions. Adequate materials/energy/water selection & use. Single breach of statutory or prescribed limit, or single complaint. |
| (3) Local | Regional stakeholder concern or 1-2 years for natural recovery or 1 week for clean-up or threatening to some species or impact on protected natural areas.<br>Involved area < 10 sq. miles.<br>Spill < 100 m³.<br>Limited discharges affecting the neighbourhood and damaging the environment with longer effects. Short term, more widespread impact on water/air/soil and biodiversity (on a higher no. of non-threatened species).<br>Limited impact due to GHG emissions.<br>Inadequate materials/energy/water selection & use. Repeated breaches of statutory or prescribed limit, or many complaints. |

| Descriptor | Description |
|---|---|
| (4) Major | National stakeholder concern or impact on licences or 2-5 years for natural recovery or up to 5 months for clean-up or threatening to biodiversity or impact on interesting areas for science.<br>Involved area < 100 sq. miles.<br>Spill < 1000 m³.<br>Large discharges with severe and long lasting environmental damage. Medium-term, widespread impact on water/air/soil and biodiversity (on some threatened species and/or one ecosystem function).<br>Extensive measures (financially significant) required to restore the impacted area.<br>Significant impact due to GHG emissions.<br>Poor materials/energy/water selection & use. Extended breaches of statutory or prescribed limits, or widespread nuisance. |
| (5) Extensive | International stakeholder concern or impact on licences/acquisitions or > 5 years for natural recovery or > 5 months for clean-up or reduction of biodiversity or impact on special conservation areas.<br>Involved area > 100 sq. miles.<br>Spill > 1000 m³.<br>Large discharges with severe and persistent environmental damage. Long term, large scale impact on water/air/soil and biodiversity (likely permanent species loss and impact on ecosystem function).<br>Very poor materials/energy/water selection & use. Extensive impact due to GHG emissions. Major financial consequences for the Company. Ongoing breaches well above statutory or prescribed limits. |

| Consequence | | | | | Likelihood or Annual Frequency | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Severity | Company Reputation | People (Health & Safety) | Environment | Assets / Project | 0 - Non credible / Could happen in E&P industry (Freq <10-6 /y) | A - Rare / Reported for E&P industry (Freq 10-6 to 10-4 /y) | B - Unlikely / Has occurred at least once in Company (Freq 10-4 to 10-3 /y) | C - Credible / Has occurred several times in Company (Freq 10-3 to 10-1 /y) | D - Probable / Happens several times per year in Company (Freq 10-1 to 1 /y) | E - Frequent / Several times per year at one location (Freq >1 /y) |
| 1 | 1-Slight impact | 1-Slight health effect / injury | 1-Slight effect | 1-Slight damage | Low | Low | Low | Low | Low | Low |
| 2 | 2-Minor impact | 2-Minor health effect / injury | 2-Minor effect | 2-Minor damage | Low | Low | Low | Medium | Medium | Medium |
| 3 | 3-Local impact | 3-Major health effect / injury | 3-Local effect | 3-Local damage | Low | Low | Medium | Medium - High | High | High |
| 4 | 4-National impact | 4-PTD or single fatality | 4-Major effect | 4-Major damage | Low | Medium | Medium - High | High | High | High |
| 5 | 5-International impact | 5-Multiple fatalities | 5-Extensive effect | 5-Extensive damage | Medium | Medium - High | High | High | High | High |

**Figure 6-1: Eni environmental risk matrix**

**Table 6-3: Risk management actions**

| Risk Rating | Management Actions Required |
|---|---|
| Low (L) | *Continuous improvement:* The level of risk is broadly acceptable and generic control measures are required, aimed at avoiding deterioration. * Non-credible hazards require no further risk assessment. |
| Medium (M) | The level of risk can be tolerable only once a structured review of the risk-reduction measures has been carried out (where necessary, the relevant guidance from the local authorities should be adopted for application of ALARP). |
| Medium – High (orange) | |
| High (H) | *Intolerable risk:* The level of risk is not acceptable and risk control measures are required to lower the risk to another level of significance. |

The environmental risk assessment process includes an analysis of inherent and residual risk levels. Inherent risk levels assume limited controls are in place. Residual risk levels are based on the application of further recommended risk reduction measures above and beyond those minimum standards, which drive the risk level down to ALARP.

## 6.2 Risk Reduction

Impacts or risks identified as requiring additional controls (the application of mitigation and management measures beyond what is standard practice for offshore petroleum activities) are subject to further review to identify the controls that are required to be provided or modified in order to reduce the residual risk.

Risk assessment is an iterative process of:

- identifying a risk
- assessing a risk
- deciding whether residual risk is tolerable
- if not tolerable, generating a new risk or mitigation measures
- assessing the effectiveness of the mitigation measures.

The acceptability of a risk, after controls and mitigation measures have been applied, is determined in accordance with ratings and associated management actions outlined in Table 6-3.

## 6.3 ALARP and Acceptance Criteria

### 6.3.1 ALARP Criteria

The ALARP principle recognises that no industrial activity is entirely risk free. ALARP is defined as a level of impact and risk that is not unacceptable and cannot be reduced further without the expenditure of costs that are disproportionate to the benefit gained. Cost may be in terms of financial, health, safety and schedule implications.

Regulation 10A(b) of the OPGGS (E) Regulations require a demonstration that environmental impacts will be reduced to ALARP. For risks to be considered to be reduced to ALARP, the criteria that must apply are:

- there are no reasonably practicable alternatives to the activity, or
- the cost (i.e. sacrifice) for implementing further measure is disproportionate to the reduction in risk.

When deciding whether risks are managed to ALARP, the items considered were:

- risk level
- existing layers of protection, including both preventive and mitigative controls
- feasibility of additional controls or alternative arrangements
- practicality of additional controls or alternative arrangements
- cost of additional controls or alternative arrangements
- effectiveness of additional controls or alternative arrangements
- impact on risks from additional controls or alternative arrangements.

### 6.3.2 Acceptance Criteria

Regulation 10A(c) of the OPGGS (E) Regulations require a demonstration that environmental impacts are of an acceptable level.

Eni considers a range of factors when evaluating the acceptability of environmental impacts associated with its activities. This evaluation is outlined in Table 6-4.

**Table 6-4: Eni acceptability factors**

| **Demonstration of Acceptability** | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Considers the legal aspect, particularly compliance with applicable legislative prescriptions and/or regulations in force which imply specific procedures to be carried out by the Titleholder to control the environmental aspect. |
| Policy Compliance | The risk or impact must be compliant with the objectives of Eni policies. |
| Social Acceptability | Considers the 'social' aspects that can alter stakeholder perception on the Titleholder's commitment regarding the safeguard and protection of the environment and that can cause serious harm to the Titleholder's public image. |
| Area Sensitivity/ Biodiversity | The proposed risk or impact controls, environmental performance outcomes and standards must be consistent with the nature of the receiving environment. |
| Environmentally Sustainable Development Principles | The overall activity is consistent with the APPEA Principles of Conduct. |
| ALARP | There is a consensus among the risk assessment team that risks or impacts are at ALARP. |

## 6.4 Workshops

Risk identification and assessment for the Petroleum Activities Program was undertaken as part of the preparation of this EP in September 2016, in the form of a meeting attended by Eni's Woollybutt Decommissioning Project Manager, Environmental Advisor and external environmental consultants. A review of the 2016 risk assessment output was undertaken in February 2019, during the preparation of this EP by the Eni Environmental Advisor and external environmental consultants, with input sought from the Woollybutt Decommissioning Project Manager and Engineers where clarifications were required. All the credible risks of the proposed Petroleum Activities Program were assessed and performance outcomes, standards and measurement criteria to reduce the risks to ALARP and acceptable were developed.

In July and September 2020, workshops were undertaken specifically relating to the current field status, risks associated with the subsea infrastructure (including recent survey results) and the recovery of subsea equipment. During the workshop a review of all other risks presented in the EP was also undertaken. Workshops were attended by external consultants and Woollybutt project personnel across the various disciplines, including environmental.

During the 2021 revisions, periodic reviews have also been conducted with the decommissioning project team to assess any significant changes, evaluate associated risks and identify relevant control measures.

Environmental risks from planned activities and unplanned events is provided in Sections 7 and 8 respectively. Performance outcomes, standards and measurement criteria are outlined in Section 9.

# 7 PLANNED ACTIVITIES

## 7.1 Interaction with Other Users (Risk ID 1)

### 7.1.1 Summary of Environmental Risk

**Vessel, IV/ MODU Presence**

| Hazard | Vessel, IV/MODU Interaction with Other Users | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | C | 1 | L |
| Residual Risk | B | 1 | L |

**Subsea Infrastructure**

| Hazard | Subsea Infrastructure Interaction with Other Users | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | C | 1 | L |
| Residual Risk | B | 1 | L |

**Corkybark-1 Wellhead Left In-situ**

| Hazard | Subsea Infrastructure Interaction with Other Users | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | A | 1 | L |
| Residual Risk | A | 1 | L |

### 7.1.2 Description of Hazard

#### 7.1.2.1 Vessel, IV/MODU Presence

The presence of vessels and IV/MODU during the Petroleum Activities Program have the potential to interact with other activities in the area such as fishing, shipping, tourism and defence activities.

The suspended shut-in wells and the DSPM are marked on nautical charts surrounded by a 500 m PSZ, which excludes other marine users from the area.

The Chevron-operated Wheatstone pipeline lies within WA-25-L, approximately 1.5 km and 1.3 km to the west of the WB-4 and WB-5A well locations, respectively (Section 4.4.7). During the P&A of these wells where a MODU is used, mooring anchors will be laid outwith the pipeline exclusion zone. Vessel interaction also has the potential to occur where Chevron is conducting pipeline maintenance at the same time that Eni is conducting activities at the WB-4 and WB-5A wellheads. Vessel / vessel interaction with the potential for collision and release of MDO has been addressed in Section 8.7.

#### 7.1.2.2 Subsea Infrastructure

In 2020, the DSPM was noted to have sunk to the seabed (Section 3.5.3). The DSPM was previously situated 30 m below the sea surface, and now sits on the seabed (Section 3.5.3). The risk severity towards other marine users remains low and the buoy position remains within a 500 m PSZ. The risk of the DSPM to other users will be eliminated once it has been recovered from the seabed (as per Section 3.8.1).

Currently, flowlines and umbilicals are partially located within the 500 m PSZ for the production wells and subsea production equipment. Once the production equipment (wellheads, DSPM, etc.) are removed from the Woollybutt field, the 500 m PSZ will be revoked. Remaining subsea infrastructure is subject to a future decommissioning EP.

#### 7.1.2.3 Corkybark-1 Wellhead Left In-situ

The CB1 wellhead and guide base extend approximately 1.3 m above the seabed, with the guide base approximately 0.15 m above the seabed and a section of drill pipe protruding approximately 0.15 m above the top of the conductor pipe (refer Section 3.5.1). The structure is located within Zone 1 of the Pilbara Trawl Fishery, which is currently closed to trawling (has been closed to trawling since 1998).

It is possible that Zone 1 reopens to trawling. However, there are currently no plans for this to occur and a number of changes are required for trawl fishing to be permitted in these areas, including amendment to the Pilbara Fish Trawl Interim Managed Fishery Management Plan.

### 7.1.3 Potential Environmental Impact

#### 7.1.3.1 Fishing

The Operational Area coincides with a number of Commonwealth and State managed fisheries (see Section 4.4). However, low levels of effort at the field location and surrounding area have been recorded, and/or a low number of fishing vessels are known to operate.

The Pilbara Fish Trawl Zone 1, which overlaps the Operational Area, is currently closed to trawl fishing and has not been open since 1998 (DoF, 2014) (see Section 4.4.3). The remaining flowlines, umbilicals and non-production wellheads at present are not a hazard to trawling.

Should Zone 1 of the Pilbara Trawl Fishery reopen in the future, the potential risk does remain for accidental damage (through snagging of nets) to trawling equipment. The Pilbara Trawl Fishery is a demersal (bottom) otter trawl fishery that operates with standard stern trawling gear with one net and two otter boards. The mesh size is >100 mm with a head rope length not exceeding 36.58m and overall trawl gear (including sweeps, bridles, and headrope) not exceeding 274.32 m. The ground rope of the net opening has rubber discs and lead weights spaced 0.5-1.3 m apart, which are designed to keep the overall ground gear weight to a minimum so that the rubber discs skip along the seabed, making only light contact (DOF 2010). Typically, the otter boards and nets are a concern for snagging, for example otter boards becoming wedged

underneath obstacles or nets becoming snagged or damaged on sharp or protruding objects.

Corkybark-1 wellhead has been present in the field for 20 years and will continue to be marked on nautical charts. The risk reducing potential of vessel automatic radar and nautical charts is considered high (Acona 2019). Modern trawl vessels have sophisticated navigation and monitoring systems to detect and avoid obstacles and would be able to easily identify and avoid the wellhead when marked on nautical charts. Given the maximum length of the trawl gear is <300 m, vessels only need to maintain a distance of 500m to avoid contact with the wellhead.

Commercial trawl fisheries may be displaced from the wellhead location as a result of avoiding the snagging risk, which would involve a minor alteration of course for the vessel. Assuming a 500m buffer zone around Corkybark-1 wellhead, the extent of the area that may be avoided by fishers is <0.015% of Zone 1. Zone 1 is approximately 1,590 square nautical miles. The petroleum activities would not affect the much larger Pilbara Trawl Fishery Zone 2, where 6,900 sq nm out of a total area of 14,980 sq nm remains currently open to trawl fishing. The potential impacts on future trawling vessels has have therefore been determined low. Furthermore, the ongoing presence of the Corkybark-1 wellhead and guide base is likely to benefit local fish populations with the structure providing a refuge for fish and hard substrate for marine growth.

The outcome of a snagging event could range from a short disturbance to the fishing operation with minor consequences (for example, loosening the wire or the door), to more severe incidents. In the event that the trawl equipment (e.g. net, door, wire) becomes snagged, it may quickly exert a strong force on the wire. This could cause equipment damage or injury to personnel due to recoil of the snapping wire or in the worst case, loss of the vessel (Ancona 2019). While it is noted that internationally there have been incidents of fisheries losses due to interactions between trawlers and oil and gas production-related debris, the likelihood of an incidence was influenced by substrate type and fishing intensity (Rouse 2020). The consequences of snagging also depends on the type and size of the trawler and strength of the wires. In stern trawlers, such as those used in the Pilbara Trawl Fishery, the trawl is deployed over the stern of the vessel. The lines pulling the trawl are lead over sheaves to winches on the vessel deck. In the event of snagging, the load would act along the long axis of the vessel and has a small arm relative to this axis and centre of gravity of the vessel. Therefore, the moment on the vessel will be limited and unlikely to lead to the vessel capsizing. The magnitude of pull from a snag event is estimated at up 50-70 tonnes (at which point a steel wire would break), compared to a displacement of 2000-4000 tonnes for a typical stern trawler. This is likely of a similar order of magnitude as the thrust of the propulsion system and therefore, on its own, unlikely to be sufficient to cause a vessel to roll over (Ancona 2019).

Currently there are only two active trawl vessels in the Pilbara Trawl Fishery (operating in Zone 2), and trawl fishing efforts have been at historically low levels (Gaughan *et al.,* 2020).

Given the above, in the rare event of a trawl fishing equipment snagging on one of the wellheads during trawling activities, the impacts to the fishery would expected to be minor and short-term, based on interruption to fishing operations and damage to

individual trawl equipment. The suspended shut-in wells and DSPM are currently marked on nautical charts surrounded by a 500 m PSZ; therefore, the likelihood of interaction between fishing vessels and this infrastructure is low.

All commercial fishing companies working in the area have been consulted regarding the field management and upcoming P&A and recovery of subsea equipment activities, and no issues have been raised. Commercial fisheries will be consulted further during the decommissioning planning (see Section 5).

No recreational fishing occurs in the Operational Area.

#### 7.1.3.2 Other oil and gas activities

Due to the proximity of the Wheatstone trunkline to the Woollybutt-4 wellhead, there is potential for interaction between Woollybutt project vessels (when working on Woollybutt-4) and vessels performing maintenance on the Wheatstone trunkline. The potential impacts include vessel interaction and displacement of pipeline maintenance activities. The Woollybutt P&A activities would not preclude access to the pipeline given the IV or MODU 500m exclusion zone will be 0.5-1 km from the pipeline and only impacts a small section (4-6 km) of the 185 km Wheatstone pipeline. Vessel / vessel interaction with the potential for collision and release of MDO has been addressed in Section 8.7. Scheduling conflicts can be managed via consultation and planning with the pipeline operator. SIMOPs are therefore not anticipated with non-project vessels. Consultation will also be conducted with the Wheatstone pipeline operator in relation to emergency arrangements.

#### 7.1.3.3 Shipping

Traffic is relatively light within the Operational Area, with the exception of the southern region. AIS data indicates that a number of tankers transit through this area, most likely on their way into and out of the ports of Ashburton and Onslow (see Section 4.4.5).

The suspended shut-in wells and DSPM are marked on nautical charts surrounded by a 500 m PSZ; therefore, the likelihood of interaction between commercial shipping vessels and this infrastructure is low.

A Notice to Mariners (NTM) will be issued by the Australian Hydrographic Office (AHO) to notify mariners of the IV/MODU location during P&A and subsea equipment removal.

#### 7.1.3.4 Defence

The Operational Area is located within a defence practice area (refer to Section 4.4.6). The Department of Defence has confirmed that operations would not interact with the proposed field management, P&A and recovery of subsea equipment activities.

#### 7.1.3.5 Tourism

Apart from the possibility of occasional passing private motor vessels or yachts, there are no known tourism interests. No known tourism occurs in the Operational Area (Section 4.4.4).

### 7.1.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- information provided to regulatory authorities and marine users directly affected by planned activities (EPO-1)
- activity is managed in accordance with navigational and safety requirements (EPO-2)
- no unplanned interactions with other users (EPO-3).

Control Measures relating to this risk include:

- navigation equipment and procedures (CM-1)
- maritime notices (CM-2)
- petroleum safety zone (CM-3)
- field management (CM-4)
- removal of subsea equipment (CM-5)
- notify marine users of the location of the CB1 wellhead and that it will remain in-situ permanently (CM-34)
- adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised (CM – 37)
- consultation with the Wheatstone pipeline operator during planning and operations (CM – 38)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 7.1.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminating the use of vessels in the Operational area | Interactions between the support vessels and other maritime traffic cannot be eliminated, though the risk is extremely low given the 500 m PSZ in place. | × |
| | Removal of subsea equipment (including DSPM) | The DSPM (and other infrastructure) is to be removed as per Section 3.8.<br>Benefits of removing the DSPM (e.g. removal of risk) outweigh the costs of its removal. | ✓ |
| | Removal of umbilicals and flowlines | This subsea infrastructure is the subject of a separate decommissioning program and EP process, which will look at a range of strategies (including removal) as per Section 3.4.4. | × |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Removal of Corkybark-1 wellhead | The removal of Corkybark-1 wellhead has been addressed in Section 3.5.1.4, with the leave in-situ option providing an equal or better environmental outcome. | × |
| Substitute | No alternative arrangements have been identified. The use of vessels and IV/MODU are required to undertake the activities | N/A. | N/A |
| Engineering | Navigation lighting and aids in accordance with AMSA Marine Orders Part 30: Prevention of Collisions, and with Marine Orders Part 21: Safety of Navigation and Emergency Procedures | Negligible costs of operating navigational equipment.<br>Navigation lighting and aids are a requirement under Marine Orders. | ✓ |
| | Field management | Field management will be conducted as per the schedule in Section 3.4.1 and rationale in Section 3.7.<br>Field management will monitor the position and integrity of the DSPM and its position. Remedial measures will be applied as necessary to ensure any anomalies identified are addressed.<br>Environmental benefit of field management on the schedule described in Section 3.4.1 is proportionate to the resources required to undertake it. | ✓ |
| | More frequent field management (e.g. not on a risk-based approach) | Provides no additional benefit. Field Management, including GVI, follows a risk-based approach and assigns frequencies based on the risk levels. Additional field management may be applied if anomalies are identified/risk levels change or following risk events (e.g. cyclones).<br>Conducting field management when not required introduces additional risks (e.g. additional risks associated with vessel use, marine growth removal) and costs which grossly outweigh the environmental benefit. | × |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Install over trawlable structure on the CB1 wellhead | The installation of an over-trawlable structure has been addressed in Section 3.5.1.4, with the leave in-situ option (as is) providing an equal or better environmental outcome.<br>There is also a risk that long term scour, corrosion or movement of anti-trawl structure may occur, compromising its effectiveness.<br>The costs and risks associated with installing an over trawlable structure on the CB1 wellhead grossly outweigh the environmental benefit. | × |
| | Rock dumping over the CB1 wellhead | Rock dumping over the wellhead has been addressed in Section 3.5.1.4.<br>Similar to the installation of an over-trawlable structure, there is a risk of long term scour or movement of the rocks, reducing its effectiveness.<br>The costs and risks associated with rock dumping on the CB1 wellhead grossly outweigh the environmental benefit. | × |
| Isolation | N/A | N/A. | N/A |
| Administrative | The Australian Hydrographic Office (AHO) and AMSA Rescue Coordination Centre (RCC) (as part of marine safety division) notifications | Minor administrative costs in notifying AHO and RCC.<br>Ensures other users are aware of the activities. | ✓ |
| | Petroleum safety zone | No additional costs. Other marine users may be temporarily excluded from areas. A PSZ is already present around the suspended shut-in subsea wells and DSPM.<br>Note: it will be revoked once the production equipment (wellheads, DSPM, etc.) have been removed. | ✓ |
| | Ongoing consultation with relevant stakeholders | Minor administrative costs in keeping relevant stakeholders informed.<br>This includes notification to relevant State and Commonwealth fisheries of CB1 wellhead left in-situ<br>The CB1 wellhead will be displayed on nautical charts. | ✓ |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised | Adhering to the Wheatstone pipeline exclusion zone will ensure that planned MODU mooring operations will not interact with the Wheatstone pipeline.<br>Where this is not possible, Eni will seek permission from the pipeline operator to enter the exclusion zone. | ✓ |
| | Consultation with the Wheatstone pipeline operator during planning and operations | Consultation with the Wheatstone pipeline operator will ensure that WB4 and WB5A well P&A and any pipeline maintenance activities will be spatially and temporally separated.<br>Consultation will also be carried out in relation to emergency arrangements. | ✓ |

### 7.1.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Vessels and IV/MODU compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) 2009.<br>Vessels and IV/MODU compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 21 (Safety of navigation and emergency procedures) 2016.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.<br>Prior to permanently leaving any structure in-situ, Eni will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act.<br>Adherence to the Wheatstone pipeline exclusion zone. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | A process of consultation has been carried out with other potential users of the area, and an NTM will be issued to mariners to notify them of the P&A and subsea equipment removal activities. A process is available for ongoing consultation and is outlined in Section 5.<br>Eni will notify relevant marine users of the location of the CB1 wellhead and that it will remain in-situ permanently<br>Eni will consult with the Wheatstone pipeline operator during planning and operations to ensure Woollybutt and Wheatstone pipeline activities will be spatially and temporally separated. |
| Area Sensitivity/ Biodiversity | Fishing levels are low in the area and no major shipping routes coincide with the area. No known tourism occurs in the area. The Operational Area is located within a defence practice area. The Department of Defence has confirmed that operations would not affect the proposed field management activities or impact on the field. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

The DSPM is to be removed as per Section 3.8. Prior to this, field management application will monitor the position and integrity of the DSPM to ensure that its integrity remains within acceptable limits and significant movement has not occurred. Field management is applied based on the schedule presented in Section 3.4.1 and rationale presented in Section 3.7.

Given the duration of the Petroleum Activities Program (see Section 3.4), the 500 m PSZ, and the low volume of shipping traffic, fishing and tourism in the Operational Area, potential impacts associated with interaction with other marine users are slight. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Potential impacts associated with interactions with other marine users are considered acceptable and ALARP. The Corkybark-1 wellhead leave in-situ decommissioning has been determined ALARP and environmentally acceptable.

## 7.2 Underwater Noise (Risk ID 2)

### 7.2.1 Summary of Environmental Risk

**Vessel, MODU and Helicopters**

| Hazard | Underwater Noise (vessels, MODU and helicopters) | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | C | 1 | L |
| Residual Risk | B | 1 | L |

**MBES from ROV**

| Hazard | Underwater Noise (MBES) | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | C | 1 | L |
| Residual Risk | B | 1 | L |

### 7.2.2 Description of Hazard

During the Petroleum Activities Program, noise emissions will be generated through the operation of support vessels, helicopters and IV/MODU operation and the use of bow thrusters to maintain position. A maximum of three PSVs and one IV or MODU will be active in the Operational Area at any one time, with typically only one or two PSVs monitoring the 500m exclusion zone around the IV or MODU while the other PSVs transit between the field and the onshore supply base. MBES from ROV may also be used to detect any hydrocarbon bubbles around WHs in the water column during field management activities (Section 3.6.2). Sound from these sources can be broadly defined as non-impulsive (vessel / helicopter operations) and impulsive (MBES use).

Flowlines, umbilicals and mooring chains will be cut using a subsea hydraulic shear cutter, hydraulic super grinder or multi cutter. Noise levels will be low and be emitted for a short period (minute to hours) during each cut. Grinding underwater may give rise to noise levels of 90 to 105 dB re 1 µPa (Mora et al, 2010), significantly less intense than that emitted from vessels and MBESs, as described below.

#### 7.2.2.1 Vessel / MODU Activities

For vessels and MODU, the noisiest anticipated activity is when the vessel and MODU use Dynamic Positioning (DP) to maintain a position and heading by using its own propellers and thrusters. Support vessels and many research vessels in the 50–100 m size class typically have broadband source levels in the 165–180 dB re 1 µPa SPL range (Gotz et al., 2009). In comparison, underwater sound levels generated by large ships can produce levels exceeding 190 dB re 1 µPa SPL (Gotz et al., 2009). Sound levels generated by support vessels and IV/MODU are discussed below.

<u>Support Vessels</u>

McCauley (1998) measured underwater broadband noise equivalent to approximately 182 dB re 1 µPa SPL @ 1 m with a frequency range of 20 Hz to 10 kHz from a support vessel using DP in the Timor Sea; it is expected that similar noise levels will be generated by support vessels used for Petroleum Activities Program. The thruster noise dropped below 120 dB re 1 µPa (thresholds that could result in behavioural response for cetaceans for continuous noise sources, refer Table 7-1**Error! Reference source not found.**) within 3 to 4 km and was audible above ambient noise up to 20 km away (McCauley, 1998).

Intervention Vessel

IVs are longer and of larger mass than support vessels (refer Section 3.10), therefore larger thrusters are required for maneuvering. Sound source levels from IVs are not widely available, therefore a vessel of comparable size and weight ( a bulk cargo ship), has been used a conservative proxy for the noise generated from an IV. Table 7-1 provides a comparison between the size of the IV and bulk cargo ship.

**Table 7-1: IV and bulk cargo ship comparison**

| Vessel | Gross tonnage | Length | Reference |
|---|---|---|---|
| IV | 8,842 | 110 to 130 m | Refer Section 3.10.2 |
| Bulk cargo ship | 25,515 | 173 | Arveson and Vendittis, 2000 |

Sound levels from bulk cargo ship propellers have been measured by Arveson and Vendittis, 2000, with levels estimated at 178 dB re 1 µPa (at speeds of 8 knots) to 192 dB re 1 µPa (at speeds of 16 knots). Noise modelling for the Woodside Scarborough development has shown that, assuming a source level of 186 dB re 1µPa SPL @ 1 m, sound levels will be reduced to 120 dB re 1µPa SPL (thresholds that could result in behavioural response for cetaceans for continuous noise sources, refer **Error! R eference source not found.**) within 4.9 km of the source (Woodside, 2020). Given the size of the vessel used for the Scarborough modelling (length 135 m, breadth 27 m and draft 6.85 m) is comparable to the IV, length 110-130 m and 8 m draft) this modelling can be used to aid prediction of the distance of IV noise to reduce to 120 dB re 1µPa SPL. Based on the Scarborough modelling, the noise measured by McCauley, 1998 for support vessels and understanding that sound levels from the IV selected for the activities are not available, a conservative distance of 6km has been assumed for IV noise to reduce to 120 dB re 1µPa SP (the behavioural response threshold for cetaceans).

MODU

A moored semi-submersible MODU may be used as a subsituite for an IV to undertake the P&A activities (refer Section 3.10). Moored MODUs are held in place using an mooring / anchoring system therefore do not require the use of DP to hold station over the well location in the same way an IV would for the P&A activities, therefore the sound sources from the MODU is limited to the sound sources from general operations during P&A.

Nedwell and Edwards (2004) provide sound measurements of a semi-submersible drilling rig, (Jack Bates semi-submerible rig) for plant operation and drilling, SPL ranged from 159.3 dB re 1µPa to 176.3 dB re 1µPa, respectively. Sound levels for a P&A activity are not available, therefore the sound levels from drilling activity is assumed a conservative maximum soud level estimate P&A. Another study of a drilling campaign using semi-submersible MODU found that noise levels at 2 km from the drilling rig exceeded 120 for only 2% of the time (APPEA, 2005).

Given the above, it assumed that the distance to the behavioural response threshold for cetaceans from moored MODU noise sources would be within that of the IV (6km).

Summary

Table 7-2**Error! Reference source not found.** presents a summary of the expected source levels and frequencies from support vessels, IV and MODU relevent to the Petroleum Activities Program.

Where an IV is used, the noise generated by the IV DP is expected to be the predominant noise source and any additive effects with support vessel noise is expected to be limited.

Where a MODU is used, the underwater noise generated by the support vessels are expected to be the predominant noise sources in the area and the contribution of P&A noise will be limited.

**Table 7-2: Sound source levels and frequencies from vessels relevant to the Petroleum Activities Program**

| Source of aspect | Operating frequency | Source Level (@1 m) | | Sound category |
|---|---|---|---|---|
| | | SPL ($L_p$) | PK ($L_{pk}$) | |
| Support vessel | 0.2 to 1 kHz [1] | 182 to 186 [1] | - | Continuous – non impulsive |
| IV | 10 Hz - 40 kHz [2] | 178.2 -192.1 [2] | - | |
| MODU | 2-500 Hz [3] (depending on phases of operations) | 159.3 -176.3 [3] | - | |

[1] McCauley (1998)
[2] Arveson and Vendittis (2000)
[3] Nedwell and Edwards (2004)

### 7.2.2.2 Helicopters

Crew changes will only be required during the P&A and recovery of subsea equipment activities and will be undertaken using helicopters.

The main acoustic source associated with helicopters is the impulse noise from the main rotor, which consists of blade-vortex interaction noise in decent or level flight at low and medium velocities and high-speed impulsive noise related to trans-sonic effects on the advancing blade. The rotating blades of helicopters produce tones with

fundamental frequencies proportional to the rate and number of blades. Noise levels for typical helicopters used in offshore operations (Eurocopter Super Puma AS332) at 150 m separation distance have been measured at up to a maximum of 90.6 dB (BMT Asia Pacific, 2005). Unconstrained point source noise in the atmosphere (such as helicopter noise) spreads spherically (Truax, 1978), with noise received at the sea surface decreasing with increasing distance from the aircraft (Nowacek *et al*., 2007). 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)

Table 7-3 presents the source levels and frequencies from helicopter operations.

**Table 7-3: Sound source levels and frequencies from helicopter operations**

| Source of aspect | Operating frequency (kHz) | Source Level (@1 m) | | Sound category | Reference |
|---|---|---|---|---|---|
| | | SPL ($L_p$) | PK ($L_{pk}$) | | |
| Helicopter operations | 0.5 | 162 | - | Continuous | Simmonds *et al.* (2004) |

#### 7.2.2.3 Multi-Beam Echo Sounder

MBESs will be used for detecting any hydrocarbon bubbles around WHs in the water column during field management (Section 3.6.2). Source levels for MBESs systems typically range from 210–245 dB re 1 µPa @ 1 m (Jimenez-Arranz *et al*., 2017) (Table 7-4). Modern shallow-water MBESs operate at hundreds of kHz (up to 700 kHz), transmitting short pulses of several tens of microseconds, and form hundreds of beams of about 1 degree width.

**Table 7-4: Estimated frequency and sound ranges for geophysical survey equipment (Jimenez-Arranz *et al.*, 2017)**

| Geophysical technique | Estimated source intensity (peak dB re 1µPa @ 1 m) | Estimated source level (rms dB re 1µPa @ 1 m) | Estimated sound exposure level (dB re 1µPa2s) | Frequency range (kHz) |
|---|---|---|---|---|
| MBES | 210 to 245 | 221 | 188 | 150 to 700 |

### 7.2.3 Potential Environmental Impact

Potential environmental impacts from noise sources include:

- Behavioural change in marine fauna (localised avoidance/attraction);
- Permanent Threshold Shift (PTS) and/or Temporary Threshold Shift (TTS) to marine fauna hearing ability;
- Inducing stress in marine fauna;
- Disruption to marine fauna underwater acoustic cues; and
- Secondary ecological effects – alteration of predator prey relationship.

#### 7.2.3.1 Impacts from non-impulsive sound sources (vessel, IV/ MODU operations)

For non-impulsive noise, only weighted- Sound exposure level (SEL) metrics are provided in the literature (Table 7-5). Estimating SEL provides a metric that integrates cumulative exposures. For PTS and TTS thresholds to non-impulsive noise, 24 hours has been provided as a suitable timeframe to estimate SEL (Southall et al. 2007). Since TTS and PTS thresholds are not provided in SPL, it is not possible to directly compare these thresholds with the predicted SPL @ 1m for the vessels / MODU as described in Section 7.2.2.

It is recognised that noise at source from the vessels / MODU exceed TTS and PTS thresholds at source. However, since cetaceans are transient in the Operational Area, which lacks aggregating habitat such as foraging, resting or calving areas, individuals are expected to pass through the Operational Area, potentially showing localised avoidance via behavioural responses (see below). In doing so, individuals are not expected to remain within the vicinity of the noise source for the duration (i.e. 24 hours) required to exceed PTS or TTS thresholds.

**Table 7-5: Permanent Threshold Shift (PTS), Temporary Threshold Shift (TTS) and behavioural thresholds for non-impulsive sources**

| Hearing group | PTS onset thresholds (received level) | TTS onset thresholds (received level) | Behavioural response |
|---|---|---|---|
| | ***Non-impulsive*** | ***Non-impulsive*** | |
| Low-frequency cetaceans | $L_E$, LF, 24h: 199 dB | $L_E$, LF, 24h: 179 dB | $L_p$ 120 dB |
| Mid-frequency cetaceans | $L_E$, MF, 24h: 198 dB | $L_E$, MF, 24h: 178 dB | $L_p$ 120 dB |
| High-frequency cetaceans | $L_E$, HF, 24h: 173 dB | $L_E$, HF, 24h: 153 dB | $L_p$ 120 dB |

Source: NMFS (2014, 2018); Southall et al. (2019).

Vessel and MODU noise levels may exceed the behavioural responses levels in cetaceans (refer to Table 7-5**Error! Reference source not found.**) out to a distances presented in Table 7-6. Within this area cetaceans may exhibit localised avoidance/attraction behaviour.

**Table 7-6: Sound source levels and frequencies from vessels and MODU relevant to the Petroleum Activities Program and distance to behavioural threshold for cetaceans.**

| Source of aspect | Operating frequency | Source Level (@1 m) | | Sound category | Distance to behavioural response threshold for cetaceans for continuous noise sources (refer Error! Reference source not found.) |
|---|---|---|---|---|---|
| | | SPL ($L_p$) | PK ($L_{pk}$) | | |
| Support vessel | 0.2 to 1 kHz [1] | 182 to 186 [1] | - | Continuous | 4 km [1] |
| IV | 10 Hz - 40 kHz [2] | 178.2 - 192.1 [2] | - | Continuous | 6 km [3] |
| MODU | Broadband, but typically low frequency sound (2-30 Hz) [4]. | 188 [4] – 196 [5] | - | Continuous | <6 km |

[1] McCauley (1998)
[2] Arveson and Vendittis (2000)
[3] Estimated based on Woodside (2020) and McCauley (1998)
[4] Nedwell and Edwards (2004)
[5] McPherson et al.(2013)

Underwater noise generated through vessel and MODU positioning and movement (continuous (non-impulsive) noise) does not have the intensity and characteristics likely to cause physiological damage in marine fauna (Nedwell & Edwards, 2004; Hatch & Southall, 2009).

Marine mammals that may occur within the Operational Area are detailed in Table 4-2 and include low-frequency (e.g. baleen whales), medium frequency (ondocetes, e.g. orca and sperm whale) and high frequency (e.g. dolphins) cetaceans. Of these species, the humpback whale is expected to be the most frequently encountered, particularly during annual migrations, given the overlap of the Operational Area with the migration BIAs, however, the nearest area of known importance to humpback whales is the Exmouth Gulf resting area, located approximately 130 km south-west of the Operational Area. Planning for the P&A activities is targeting an execution window of the Q4 2021 (Section 3.4) with equipment removal planned to follow. The P&A activities and equipment removal activity will therefore occur outside of the peak humpback whale southbound migratory period (August-October) for the North West Cape region (Jenner et al 2001).

Five species of species of turtle may pass through the Operational Area (Section 4.3), and the Operational Area overlaps with the BIA for the flatback turtle (Figure 4-5); however, turtle species are not likely to be resident or occur in the area in significant numbers. Water depths in the Operational Area suggest the area is unlikely to comprise important habitat for the turtles during any life history phase of the species.

Thresholds for non-impulsive noise emissions have not been identified for marine turtles, however, 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). Popper et al. (2014) identified mortality or permanent injury as being low risk to marine turtles, and TTS is moderate close to the source only.

Based on the limited data regarding noise levels that illicit a behavioural response in turtles, the lower level of 166 dB re 1 µPa level drawn from NSF (2011) is typically applied as the threshold level at which behavioural disturbance could occur, such as diving and avoidance.

Impacts from non-impulsive noise are not considered significant due to the following:

- Given cetaceans mobility and ability to avoid the sound source, PTS and TTS criteria (Table 7-7), which is based on a 24 hour exposure is not anticipated to be exceeded;
- Behavioural responses in cetaceans may occur out to a distance of 4 km (McCauley, 1998) and 6 km (Woodside, 2020) for support vessels and IV/MODU respectively;
- The presence of support vessels and IV/MODU will occur within a localised area of the operational area, where the activities will be centred. Cumulative impact from the use of multiple vessels is not considered to present significant impacts to marine fauna given their mobility and ability to avoid the sound source, impacts will relate to behavioural disturbance / avoidance only. The operational area is not within an area of high shipping density (Section 4.4.5), therefore should avoidance behaviour occur it is anticipated that the marine fauna would be able to move to an area below the behavioural threshold;
- The P&A activities and equipment removal activity have been scheduled outside of the peak humpback whale southbound migratory period (August-October) for the North West Cape region (Jenner et al 2001).

- Marine turtles are at low risk of mortality or permanent injury due to continuous noise sources, such as vessels, subsea infrastructure or the FPSO, even near the source (Popper et al. (2014);
- Marine mammals and turtles are transitory, and given the low frequency and duration of Petroleum Activities Program (Section 3.4), behavioural impacts are expected to be temporary and at the individual level only;
- Reactions of marine mammals to circling aircraft (fixed wing or helicopter) are sometimes conspicuous if the aircraft is below an altitude of 300 m, uncommon at 460 m and generally undetectable at 600 m (NMFS, 2001). Impacts to marine mammals will be behavioural (diving and avoidance) and short term only, with no lasting effect.

#### 7.2.3.2 Impacts from impulsive sound sources (MBES)

JASCO (2013) conducted noise modelling for low energy survey instruments off the coast of California. MBES, was modelled in a sandy bottom environment and at a water depth of 64 m, slightly shallower than that of Operational Area. Given the similarities in the seafloor habitat and water depth, the modelling is considered comparable for the nature and scale of the MBES equipment used during the Petroleum Activities Program.

The modelling reported distances to specific threshold levels for different types of marine mammals. Where applicable m-weighted Rmax (the distance to the farthest occurrence of the threshold level) estimates were used. A behavioural threshold of 160 dB re 1 µPa (rms SPL) was used, based on the United States (US) National Marine Fisheries Service (NMFS, 2018) acoustic threshold for behavioural effects in marine mammals. 160 dB re 1 µPa is considered conservative and the lowest impact threshold presented in Table 7-7. The 160 dB re 1 µPa (rms SPL) threshold was reached at the 290 m distances during the modelling.

**Marine Mammals**

Marine mammals that may occur within the Operational Area are detailed in Table 4-2 and include low-frequency (e.g. baleen whales), medium frequency (ondocetes, e.g. orca and sperm whale) and high frequency (e.g. dolphins) cetaceans. PTS and TTS and behavioural thresholds for impulsive sources for low, mid and high frequency cetaceans have been presented in Table 7-7.

**Table 7-7: Permanent Threshold Shift (PTS), Temporary Threshold Shift (TTS) and behavioural thresholds for impulsive sources**

| Hearing group | PTS onset thresholds (received level) | TTS onset thresholds (received level) | Behavioural response |
|---|---|---|---|
| | ***Impulsive*** | ***Impulsive*** | |
| Low-frequency cetaceans | $L_{pk}$, flat: 219 dB<br>$L_E$, LF, 24h: 183 dB | $L_{pk}$, flat: 213 dB<br>$L_E$, LF, 24h: 168 dB | $L_p$ 160 dB |
| Mid-frequency cetaceans | $L_{pk}$, flat: 230 dB<br>$L_E$, MF, 24h: 185 dB | $L_{pk}$, flat: 224 dB<br>$L_E$, MF, 24h: 170 dB | $L_p$ 160 dB |
| High-frequency cetaceans | $L_{pk}$, flat: 202 dB<br>$L_E$, HF, 24h: 155 dB | $L_{pk}$, flat: 196 dB<br>$L_E$, HF, 24h: 140 dB | $L_p$ 160 dB |

Source: NMFS (2014, 2018); Southall et al. (2019).

MBES sound levels are outside the auditory range of low frequency species / baleen whales (e.g. humpback and pygmy blue whales) but within the mid-frequency and high frequency cetacean marine fauna auditory range (e.g. sperm whales and dolphins) (Table 7-8)

**Table 7-8: Frequency range of MBES and overlap with low, mid and high frequency cetacean auditory range**

| Geophysical source | Frequency Range (kHz) (Jimenez-Arranz et al., 2017) | Potential disturbance from MBES | | |
|---|---|---|---|---|
| | | Low-frequency cetaceans[1] | Mid-frequency cetaceans[1] | High frequency cetaceans[1] |
| **Auditory frequency range (kHz)** | | **0.07 - 22** | **0.15 - 160** | **0.2 - 180** |
| MBES | 150 – 700 | X | ✓ | ✓ |

Source: Southall et al 2007

Mid and low-frequency cetaceans have been identified as potentially occurring in the Operational Area. Impacts to these species will be behavioural, within a few hundred

metres. Observed disturbance responses to impulsive sound sources such as MBES in cetaceans include altered swimming direction; increased swimming speed including startle reactions; breathing and diving patterns; avoidance of the sound source area and other behavioural changes.

Impacts from impulsive noise on marine mammals are not considered significant due to the following:

- Impulsive noise sources are restricted to MBES which emit pulses outside the auditory frequency range of baleen whales such as humpback whales, the most common species in the Operational Area;
- PTS and TTS thresholds for mid and low frequency cetaceans are only expected to be exceeded close to the source. Due to the lack of aggregating areas for these species, individuals are expected to be transitory only, displaying behavioural responses, and moving away from the source, before thresholds are exceeded.

**Marine Reptiles**

Five species of species of turtle may pass through the Operational Area (Section 4.3), and the Operational Area overlaps with the BIA for the flatback turtle (Figure 4-5); however, turtle species are not likely to be resident or occur in the area in significant numbers. Water depths in the Operational Area suggest the area is unlikely to comprise important habitat for the turtles during any life history phase of the species.

Dow Piniak (2012) found that green, leatherback and hawksbill turtles have the greatest hearing sensitivity between 50-400Hz, therefore the audible frequency range of marine turtles overlaps with the MBES frequency presented in Table 7-4.

Thresholds provided in Table 7-9 are considered appropriate for the assessment of impacts from impulsive noise to marine turtles from the Petroleum Activities Program.

**Table 7-9: Impulsive noise exposure thresholds for injury and behaviour response for marine turtles**

| Species | Received Level | | | Effect | Source |
|---|---|---|---|---|---|
| | (dB re 1 µPa RMS) | (dB re 1 µPa pk) | (cSEL (dB re 1 µPa.s$^2$) | | |
| Sea Turtles | - | >207 | 210 | Injury | Popper et al. (2014) |
| Sea Turtles | - | 226 | | TTS threshold | Finneran et al. (2017) |
| Sea Turtles | | 232 | | PTS threshold | Finneran et al. (2017) |
| Sea Turtles | 166 dB re 1 µPa | | | Behavioural | McCauley et al. (2000) |

Studies indicate that turtles may begin to show behavioural responses to an approaching impulsive sounds levels of approximately 166 dB re 1 µPa, and avoidance at around 175 dB re 1 µPa (McCauley et al., 2000). Considering the US NMFS criterion

for behavioural effects in turtles of 166 dB re 1 µPa (SPL) and the sound modelling (JASCO, 2013) the MBES equipment could potentially disturb turtles within a distance of a few hundred metres. Turtle behavioural responses when exposed to underwater noise include diving and avoidance. Such disturbances are not expected to have any significant effect on individual turtles and be limited to behavioural changes for the duration of exposure

Impacts to marine turtles are not considered significant based on the following:

- Water depths in the Operational Area suggest the area is unlikely to comprise important habitat for the turtles. Individuals are expected to show behavioural response to the source only and any displacement from the area, due to avoidance by individuals, is not expected to affect individual fitness or viability of the overall population;
- There is a moderate risk of TTS to marine turtles if they are exposed near the MBES source, however, individuals are expected to show display behavioural response, moving away and outside the range at which TTS could occur;
- Behavioural responses are expected to occur near the sources, these will be limited to avoidance or temporary changes in swimming behaviour.

**Fish**

Impacts on fish are likely to be minimal and limited to behavioural disturbance, as fish may avoid acoustical emissions at levels that have the potential to cause pathological effects (Hatch & Southall, 2009). Whale sharks may pass through the Operational Area between April and November as they migrate to foraging grounds on Ningaloo Coast. Given the short duration and intermittent nature of the Petroleum Activities Program activities, it is unlikely that noise generated will significantly alter whale shark migration. Species richness has been shown to correlate with habitat complexity (Gratwicke and Speight, 2005), it is unlikely that the sand sediments that comprise the largest proportion of the Operational Area support a wide diversity of species.

Fish may temporarily be displaced from the immediate vicinity of a noise source; however, they would be expected to behave normally once the noise ceased. Thresholds and Rmax distances in JASCO (2013) suggest that TTS (207- 213 dB PK) in fish could occur 1 m of the MBES source. Fish are expected to move rapidly outside of the distances at which any TTS could occur and therefore behavioural impact is anticipated only.

### 7.2.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no injury or mortality to EPBC Act and WA Biodiversity Conservation Act 2016 listed fauna during operational activities (EPO 4)

Control Measures relating to this risk include:

- regulations and measures for interacting with marine fauna (CM-6)
- marine fauna observations/reporting undertaken (CM-7).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 7.2.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminating the MBES | Underwater noise associated with the MBES cannot be eliminated as the assessment technique is required to detect any hydrocarbon bubbles around WHs in the water column and cannot be eliminated. | × |
| | Eliminating the helicopters, vessels and IV/MODU use | The noise associated with the use of helicopters, vessels and IV/MODU cannot be eliminated.<br>Elimination of helicopters, vessels and IV/MODU would mean the activities cannot be competed. | × |
| Substitute | Substitute IV/MODU vessel | The support vessels and IV/MODU will be contracted to meet the specifications of the scheduled work and cannot be substituted. | N/A |
| Engineering | N/A | N/A. | N/A |
| Isolation | N/A | N/A. | N/A |
| Administrative | Compliance with administrative controls (e.g. EPBC Regulations 8 (Part 8) | Minor cost in complying, with benefit in reducing impact to marine fauna from noise impacts. | ✓ |
| | Scheduling P&A and equipment removal activities outside of whale shark aggregation and migratory period (April–November) and peak humpback whale southbound migratory period (August-October) | Planning for the P&A activities is targeting an execution window of the Q4 2021 (Section 3.4). The P&A activities have been scheduled outside of the peak humpback whale southbound migratory period (August-October) for the North West Cape region (Jenner et al 2001).<br>The timing of field management and equipment removal activities will be subject to vessel availability and weather conditions. Given the low risk to marine fauna in the region, rescheduling the activities will not result in significant environmental benefit. | × |
| | Dedicated Marine Fauna Observer (MFO) on vessels | May improve ability to spot and identify marine fauna at risk of impact from noise. However, the high cost of contracting MFOs is grossly disproportionate to the low risk (refer | × |

| | | | |
|---|---|---|---|
| | | to Section 7.2.3) of vessel and MBES noise sources on marine fauna. | |

### 7.2.6 Acceptability Demonstration

| **Demonstration of Acceptability** | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | The *EPBC Regulations 2000* Part 8 and the Australian National Guidelines for Whale and Dolphin Watching (DEH, 2005) will be implemented.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to underwater noise. |
| Area Sensitivity/ Biodiversity | The Operational Area is within a BIA for:<br>• pygmy blue whale – distribution<br>• humpback whale – migration<br>• flatback turtle – internesting buffer and suitable mating habitat<br>• whale shark – foraging including high density prey.<br>Vessel disturbance/interaction is identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice.<br>The following Recovery Plans or Conservation Advice / Plans identify noise as a threat:<br>• Recovery Plan for Marine Turtles in Australia (DoEE, 2017)<br>• Conservation Management Plan for the Blue Whale, 2015-2025 (Commonwealth of Australia, 2015)<br>• Approved Conservation Advice for Megaptera novaeangliae (humpback whale) (TSSC, 2015)<br>The Recovery Plan for Marine Turtles in Australia (DoEE, 2017) identifies noise interference as a threat to marine turtle recovery. Noise interference to marine turtles is classified depending on whether the exposure is short (acute) or long-term (chronic), with activities such as pile driving, seismic activity and some forms of dredging generating being forms of acute noise threat, and sources including shipping channels and the operation of some oil and gas infrastructure being forms of chronic noise threats. A key action from the Recovery Plan for Marine Turtles in Australia (DoEE, 2017) relating to noise is 'Understand the impacts of anthropogenic noise on marine turtle behaviour and biology'. Section 7.2.3 provides a detailed assessment on the impact of noise from the Petroleum Activities Program on marine turtles. Impacts to marine turtles are not considered significant and relate to behavioural disturbance only. The Petroleum Activities Program is determined not inconsistent with the Recovery Plan for Marine Turtles in Australia (DoEE, 2017).<br>The Conservation Management Plan for the Blue Whale, 2015-2025 (Commonwealth of Australia, 2015) identifies noise interference as a threat that may inhibit the recovery of blue whale populations in Australian waters. An action in the plan relating to noise threat is |

| Demonstration of Acceptability | |
|---|---|
| | 'assessing the effect of anthropogenic noise on blue whale behaviour. Section 7.2.3 provides a detailed impact assessment of the vessel and MBES noise on marine mammals. Impacts have been determined to be behavioural only, within 6 km of the source (refer Section 7.2.3)<br>The approved Conservation Advice for Megaptera novaeangliae (humpback whale) (TSSC, 2015) identifies impacts of anthropogenic noise sources on marine mammals as an area of increasing concern. Noise sources identified include: include seismic exploration, industrial noise (pile driving, some forms of dredging, use of explosives, blasting and drilling), shipping noise, and sonar systems. A key action in the plan is to 'Assessing and addressing anthropogenic noise; shipping, industrial and seismic surveys'. Section 7.2.3 provides a detailed assessment of noise impacts from the Petroleum Activities Program on the humpback whale and a number of controls have been investigated to reduce noise impacts (Section 7.2.3). MBES sound levels are outside the auditory range to cause of low frequency species / baleen whales (e.g. humpbacks). Impacts have been determined to be behavioural only, within 6 km of the source (refer Section 7.2.3)<br>Eni has considered the actions and objectives of the aforementioned Recovery Plans. While the Petroleum Activities Program is not inconsistent with theses Recovery Plans, relevant actions and objectives within these Recovery Plans have been addressed and impacts to species have been determined to be slight and relate to behavioural disturbance only. Therefore, it is determined that the impacts from underwater noise generated by the Petroleum Activities Program to species detailed in the Recovery Plans are acceptable. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk demonstrates to be ALARP. |

Additional controls were considered but they were not implemented as they are not considered ALARP.

During the Environmental Risk Identification Workshop, it was identified that the risk of underwater noise impacts on cetaceans may be reduced by scheduling activities outside of the peak humpback southern migration period (August to October) for the North West Cape or whale shark aggregation and migratory period (April–November). The P&A and equipment removal activities have been scheduled outside of the peak humpback whale southbound migratory period for the North West Cape region.

As identified above, the Petroleum Activities Program is not inconsistent with the following:

- Recovery Plan for Marine Turtles in Australia (DoEE, 2017)
- Conservation Management Plan for the Blue Whale, 2015-2025 (Commonwealth of Australia, 2015).
- Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (TSSC, 2015)

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk associated with

disturbance/interaction is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Potential impacts associated with noise emissions are therefore acceptable and ALARP.

## 7.3 Light Emissions (Risk ID 3)

### 7.3.1 Summary of Environmental Risk

| Hazard | Light Emissions | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | B | 1 | L |

### 7.3.2 Description of Hazard

Lights on support vessel(s) and IV/MODU will be required on a 24-hour basis for safety and navigational purposes in accordance with requirements of the *Navigation Act 2012* (Marine Orders Part 30 [Prevention of Collisions]).

### 7.3.3 Potential Environmental Impact

Artificial lighting can cause a change in the behaviour of fauna, particularly nesting turtles and birds. The main implication of artificial lighting from offshore vessels for marine turtles is the disruption of hatchling sea-finding behaviour, as hatchlings can be disoriented if lights or atmospheric glow occur away from the sea. Adult turtles are more inclined to avoid brightly lit facilities (Witherington & Martin, 1996). Artificial lighting may also attract seabirds or migratory shorebirds, in the event that the activities coincide with shorebird migrations.

Adult green turtles nesting on the west coast of Barrow Island also tend to remain close to shore (within 5 km of nesting beaches) during inter-nesting periods (Pendoley, 2005). As the Operational Area is located approximately 35 km from the nearest turtle nesting beach at Barrow Island, light emissions from support vessels and the IV/MODU are not expected to affect the sea finding behaviour of hatchling turtles.

Cetacean species are not expected to be affected by light generated by the Petroleum Activities Program. Certain pelagic species such as fish and plankton species may be attracted to a localised area.

Light generated by the Petroleum Activities Program is temporary and short term in nature (see Section 3.4 for durations), and given the limited area over which light emissions are likely to extend, impacts to marine fauna are unlikely.

### 7.3.4 Environmental Performance Outcomes and Control Measures

During the evaluation of the potential impacts of light emissions as a result of the activities, it was determined that no control measures were required as the inherent consequence of support vessel, IV/MODU light emissions is expected to be negligible. Therefore, no additional management controls area required to reduce the risk to ALARP. Risk is ALARP and acceptable in its current state.

### 7.3.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate light sources on vessels/IV | Lighting levels cannot be reduced or eliminated as this would introduce navigational and occupational safety hazards and non-compliance with codes and regulations. | × |
| | No night-time operations | Reducing lighting at night would restrict the activity hours to during the daytime, resulting in the activity taking approximately twice as long to complete. Given the low levels of lighting already on the vessels, there would be little environmental benefit. | × |
| Substitute | Use of 'turtle friendly' light sources | Substituting external lighting with 'turtle friendly' light sources (reduced emissions in turtle visible spectrum) would result in significant cost sacrifice. The retrofitting of all external lighting on all vessels and IV/MODU would result in considerable cost and time expenditure. Given the distance of the Operational Area from turtle nesting beaches, there would be little environmental benefit. | × |
| Engineering | N/A | N/A. | N/A |
| Isolation | N/A | N/A. | N/A |
| Administrative | Navigation lighting and aids in accordance with AMSA Marine Orders Part 30: Prevention of Collisions, and with Marine Orders Part 21: Safety of Navigation and Emergency Procedures | This control is already a requirement under Marine Orders and discussed in Section 7.1. It does not relate to reducing lighting effects on marine fauna. | ✓ (as a control in Section 7.1) |

### 7.3.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Vessels will comply with safety and navigation requirements outlined in the *Navigation Act 2012* (Marine Orders Part 30 [Prevention of Collisions]), the Vessel Operating Procedure and APPEA Code of Environmental Practice 2008.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to light emissions. |
| Area Sensitivity/ Biodiversity | Artificial lighting can cause a change in the behaviour of fauna, particularly nesting turtles and birds. Light generated by activities is temporary and short term in nature (see Section 3.4), and given the limited area over which light emissions are likely to extend and location of the Operational Area (located approximately 35 km from the nearest turtle nesting beach at Barrow Island), impacts to marine fauna are highly unlikely. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Lighting will be kept to a minimum required to satisfy safety and navigational requirements in accordance with requirements of the *Navigation Act 2012* (Marine Orders Part 30 [Prevention of Collisions]), the Vessel Operating Procedure and APPEA Code of Environmental Practice 2008.

Reduction in lighting levels would introduce navigational, occupational safety hazards and non-compliance with codes and regulations and is therefore deemed to be unfeasible. Lights on support vessel(s) and IV/MODU will be kept on for 24 hours a day for safety purposes in accordance with requirements of the *Navigation Act 2012* (Prevention of Collisions).

Undertaking the activity in daylight hours only would extend the duration of activity, increasing the potential of other risks occurring and increasing costs of the Petroleum Activities Program. Since lighting would still be required at night for safety reasons (see above), no environmental benefit is gained from eliminating night-time operations. No additional controls were identified during the risk workshop to reduce the risk further. Given the short duration of the Petroleum Activities Program (refer Section 3.4) and the distance of the Operational Area from the nearest turtle nesting beaches (35 km), impacts to marine fauna are unlikely. A number of controls have been evaluated and in accordance with the ALARP criteria (Section 6.3.1). The residual risk associated with light emissions is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-3). Therefore, potential impacts associated with light emissions are acceptable and ALARP.

## 7.4 Atmospheric Emissions (Risk ID 4)

### 7.4.1 Summary of Environmental Risk

| Hazard | Atmospheric Emissions | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | B | 1 | L |

### 7.4.2 Description of Hazard

Exhaust gases are produced from combustion for power generation on board the support vessels and IV/MODU and are ultimately released into the atmosphere. A vessel on DP typically uses approximately 16 t of diesel per day. Vessel and IV/MODU activity is not constant within the Operational Area and atmospheric emissions from these sources are therefore limited to periods relating to that specific activity (e.g. field management, P&A and recovery of subsea equipment activities).

Products of hydrocarbon combustion emitted to the atmosphere include emissions of greenhouse gases (GHG), such as carbon dioxide ($CO_2$), methane (CH4) and nitrous oxide ($N_2O$), along with non-GHG such as sulphur oxides ($SO_X$) and nitrogen oxides ($NO_X$). There may also be emissions of particulate matter, and hydrocarbons, including BTEX (benzene, ethyl benzene, toluene, and xylene).

During P&A activities the gas in the annulus will be circulated or lubricated back to surface and will be vented from a dedicated surface bleed-off package on the IV/MODU. It is expected that the total volume of gas brought to surface on each well is approximately 1,550 ft³ during P&A activities, for the purpose of well integrity. Venting will be limited to the gas in the annulus. Should all seven wells be P&A, a total of 10,850 ft³ will be emitted to the atmosphere.

### 7.4.3 Potential Environmental Impact

Hydrocarbon combustion from support vessels and IV/MODU, and venting of gas during P&A may result in a temporary, localised reduction of air quality in the environment immediately surrounding the discharge point.

Non-GHG emissions, such as $NO_X$ and $SO_X$, and GHG emissions can lead to a reduction in local air quality which could impact humans and seabirds in the immediate vicinity of the discharge and add to the national GHG loadings.

Local impacts typically associated with the emissions are mitigated by the dispersive nature of the offshore environment. Any potential local elevated concentrations of emissions will be short lived and unlikely to be detectable except in the near vicinity of the release. Combustion of fuels within the Operational Area will not impact on air quality at any nearby settlement areas, the nearest being approximately 65 km south of Onslow and 35 km east of Barrow Island.

Air emissions will be similar to other vessels operating in the region for both petroleum and non-petroleum activities.

Air emissions are not expected to significantly affect air quality or contribute significantly to greenhouse gas contributions to the atmosphere.

### 7.4.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- atmospheric emissions in compliance with Marine Order 97 requirements to restrict emissions to those necessary to perform the activity (EPO-5).

Control Measures relating to this risk include:

- air pollution prevention certification (CM-8)
- fuel type used (CM-9).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 7.4.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminating the use of vessels in the Operational Area | Vessels are required to carry out P&A and field management activities and vessel use cannot be eliminated. | × |
| | No incineration of waste on vessels | Eliminate the potential for emissions due to waste incineration to impact air quality. However, increases health risk from storage of wastes. Increase in risk due to transfers (increased fuel usage, potential increase in collision risk, disposal on land). | × |
| | Eliminate venting | Venting of gas is required for safety and well integrity purposes and cannot be eliminated. Venting is limited to the gas in the annulus only. | × |
| Substitute | Use green energy sources on IV/MODU or support vessels | Alternatives such as renewable energy generators (wind and/or sun) are not viable options as they are weather-dependant and do not supply continuous base load power. The vessels will use marine diesel, which is low in sulphur dioxide (rather than heavy fuel oil). | × |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Use of low sulphur fuel on the vessels and IV/MODU, in accordance with Marine Order 97 | Reduces emissions through use of low sulphur fuel in accordance with Marine Order 97. Minimal cost as vessels required to comply with Marine Orders. | ✓ |
| Engineering | N/A | N/A. | N/A |
| Isolation | The Operational Area is located in an isolated offshore environment that will assist in the dispersion and dilution of atmospheric emissions | N/A. | N/A |
| Administrative | Vessels Air Pollution Prevention Certificate (IAPP)/comply with the requirements of MARPOL 73/78 Annex VI and Marine Order 97 | Reduces probability of potential impacts to air quality due to ODS emissions, high NOx, SOx and incineration emissions. Benefits of ensuring vessel is compliant outweighs the minimal administrative costs and it is a legislated requirement. | ✓ |

### 7.4.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Vessels will comply with the requirements of MARPOL 73/78 Annex VI and Marine Order 97.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to atmospheric emissions. |
| Area Sensitivity/ Biodiversity | Offshore location means winds will disperse and dilute emissions rapidly.<br>No human settlements nearby. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

There are no alternatives to the release of atmospheric emissions. Retrofitting the vessels with new equipment may reduce atmospheric emissions, however this is considered unnecessary and cost prohibitive, and would not result in a significant reduction in the environmental risk.

Venting is limited to the volume of gas in the annulus only and must be emitted for well integrity purposes for P&A to occur. No other venting will occur.

Given the duration of the Petroleum Activities Program (see Section 3.4) and receptors in the Operational Area, potential impacts associated with atmospheric emissions are slight. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Therefore, potential impacts associated with atmospheric emissions are acceptable and ALARP.

## 7.5 Discharge of Contaminated Water (Risk ID 5)

### 7.5.1 Summary of Environmental Risk

| Hazard | Discharge of Contaminated Water | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 2 | L |
| Residual Risk | B | 1 | L |

### 7.5.2 Description of Hazard

Deck drainage on the support vessels and IV/MODU consists of rain and wash down water that may contain small amounts of detergents, residual hydrocarbons and chemicals spilt or stored on the deck floor. Bilge water consists of deck drainage and machinery space water that has been directed to a bilge water tank. Bilge water shall be diverted to a holding tank either for onshore disposal at an appropriately licensed facility, or for discharge with an oil content of less than 15 parts per million (ppm) in accordance with MARPOL 73/78 Annex I/ Marine Order 91.

Potable water for drinking and domestic use on board the support vessels and IV/MODU is produced from seawater, which is drawn from the ocean and treated by reverse osmosis. A by-product of reverse osmosis is reject brine water and cooling water, which is discharge to the marine environment. Cooling water is used as a heat exchange medium for the cooling of machinery engines on the support vessels and IV/MODU. Seawater is drawn from the ocean and flows counter-current through closed-circuit heat exchangers, transferring heat engines and machinery to the seawater. The water is then discharged to the ocean. Cooling water temperatures vary dependent upon the engine's workload and activity.

### 7.5.3 Potential Environmental Impact

The environmental impacts associated with an oily water discharge are likely to be highly localised and temporary, due to the low volumes and the high dilution rates expected at the open ocean environment of the Operational Area (Black *et al.* 1994). Hinwood *et al.* (1994) predicted dilution factors in excess of 10,000 within 100 m of the discharge point.

Cooling water will remain in the surface layer, where turbulent mixing and heat transfer with surrounding waters will occur. This will cause localised increases in water temperature. The potential impacts of increased seawater temperatures downstream of the cooling water discharge are localised changes to the physiological processes of marine organisms (particularly plankton) including attraction or avoidance behaviour. Given that the temperature of the discharge is only marginally higher than that of the receiving waters and the receiving environment is subject to strong currents, the impacts of cooling water discharges are considered minor and will be temporary and localised.

### 7.5.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no unplanned discharge of oily water or chemicals that are not in accordance with Marine Order 91 requirements (EPO-6).

Control Measures relating to this risk include:

- oily water treatment system in place (CM-10)
- oily water prevention in place (CM-11).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 7.5.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate contaminated water discharge on vessels and IV | Eliminating the discharge would mean storing the liquids on the vessels and/or IV. Storage space required for containment and an increase in transfers to shore for disposal would be required. Increased transfers result in increased fuel usage and increased safety risks. | × |
| Substitute | N/A | N/A. | N/A |
| Engineering | Vessels and IV/MODU are equipped with oily water prevention system and IMO approved oil filtering equipment | Reduces potential impacts of planned discharge of oily water to the environment with minor administrative and maintenance cost. | ✓ (through compliance with Marine Order 91) |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Continually plug the deck drains on support vessels and IV/MODU to prevent deck drainage | Would eliminate potential impacts of contaminants being discharged to sea from deck water, however, would present increased health and safety risks from wet deck and water on a vessel/IV/MODU deck can also cause stability issues.<br>Storage space required for containment of drained liquids, increase in transfers to vessels resulting in increased potential impacts and risks. | × |
| Isolation | Capture of contaminated waters/bilge water | Fixed equipment, such as engines and generators, are contained and captured in the bilge water tank for treatment via the OIW separator (on vessels and IV) in compliance with Marine Order 91. | ✓<br>(through compliance with Marine Order 91) |
| Administrative | Treatment systems on board the IV/MODU and vessels to comply with Marine Order 91 (Marine pollution prevention oils) requirements | Environmental benefits outweigh the time and personnel costs in maintaining oil record book and implementation costs. | ✓<br>(through compliance with Marine Order 91) |

### 7.5.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | The existing water treatment systems on board the support vessels and IV/MODU will comply with MARPOL 73/78 Annex I/Marine Order 91 (Marine pollution prevention oils) requirements.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to discharge of contaminated water. |

| Demonstration of Acceptability | |
|---|---|
| Area Sensitivity/ Biodiversity | Any water quality impacts are likely to be localised and subject to rapid mixing.<br>Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Enhanced water treatment prior to disposal was considered but deemed impractical as the cost of retrofitting would be disproportionate to the benefit gained. The existing water treatment systems on vessels and IV/MODU will comply with MARPOL 73/78 Annex I/Marine Order 91 (Marine pollution prevention oils) requirements.

Onboard storage of deck drainage, oily water (i.e. bilge water), brine and cooling water discharges for onshore disposal would result in a greater frequency of trips to port (increasing fuel consumption by vessels and activity duration), which in turn would increase the potential of other risks, therefore is disproportionate to the environmental benefit.

Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). Given the duration of the Petroleum Activities Program, the low volume of discharge from the IV/MODU and vessels, relating to contaminated water discharge and receptors in the Operational Area, the potential impacts associated with discharge of contaminated water are considered to be slight and will not compromise the objectives set out in the Recovery Plans and Conservation Advice. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Potential impacts associated with discharge of contaminated water are acceptable and ALARP.

## 7.6 Sewage, Grey Water and Putrescible Waste Discharges (Risk ID 6)

### 7.6.1 Summary of Environmental Impact

| Hazard | Sewage, Greywater and Putrescible Waste Discharges | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | B | 1 | L |

### 7.6.2 Description of Hazard

Support vessels and IV/MODU will produce putrescible wastes such as greywater, sewage and food scraps during Petroleum Activities Program. Approximately 100 L of sewage/greywater and approximately 1 L of food waste will be produced per person per day, per vessel.

### 7.6.3 Potential Environmental Impact

Sewage discharge may result in an increase in nutrient availability and biological oxygen demand (BOD) in the marine environment. In the open oceanic environment, the effect of the effluent BOD on seawater oxygen concentrations is expected to be insignificant (Black *et al.,* 1994).

Discharge of putrescibles wastes may attract pelagic marine fauna, such as fish and sharks, and increased nutrient availability may result in the biostimulation of marine organisms and a slight increase in algal growth in the local environment near the outlet. The mass of nutrients to be discharged in sewage on a daily basis is likely to be small and, given the open ocean environment of the field, rapid dilution of the effluent is expected, resulting in highly localised effects (Black *et al.,* 1994).

Monitoring of sewage and grey water discharges from a drill rig operating in the Timor Sea concluded that discharges were rapidly diluted in the surface layer of the water column (within 10 m of the surface), and there were no measurable impacts on water quality parameters 50 m from the release site (Woodside, 2011).

The discharge of sewage, grey water and putrescible wastes is considered unlikely to have any significant adverse effects on the marine environment.

### 7.6.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no unplanned discharges to sea of untreated sewage, greywater, putrescible wastes, bilge and deck drainage (EPO-7).

Control Measures relating to this risk include:

- sewage and waste management (CM-12)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 7.6.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminating discharge on vessels and IV | The generation of sewage, greywater and putrescible waste by personnel cannot be eliminated on the vessels or IV/MODU, as storing the waste would present a safety issue.<br>Transportation to shore was considered as an alternative to ocean discharge; however, this would be excessively costly and impractical due to the lack of storage capacity onboard the vessels or IV/MODU, and would result in increased vessel transits to provide ship-to-shore services. It also provides an increased exposure to biological health hazards, and safety hazards such as bulk transfer and heavy lifting operations.<br>This discharge is permitted under Marine Orders and is not anticipated to present significant environmental impact. | ✗ |
| Substitute | N/A | N/A. | N/A |
| Engineering | N/A | N/A. | N/A |
| Isolation | N/A | N/A. | N/A |
| Administrative | Implementation of measures in Marine Order 95 (Marine pollution prevention – garbage) and Marine Order 96 (Prevention of pollution – sewage). | Marine Order 95 reduces potential impacts of inappropriate discharge of sewage.<br>Marine Order 96 reduces probability of garbage being discharged to sea, reducing potential impacts to marine fauna. Marine Order 95 stipulates putrescible (food) waste disposal conditions and limitations.<br>Environmental benefit outweighs the minor administrative costs in implementing the Marine Orders. | ✓<br>(through compliance with Marine Orders 95 and 96) |

### 7.6.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Support vessels and IV/MODU compliant with MARPOL Annex V 73/78 and Marine Order 95.<br>Support vessels and IV/MODU compliant with MARPOL 73/78 Annex IV/Marine Order 96.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |

| **Demonstration of Acceptability** | |
|---|---|
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to discharge of sewage, greywater and putrescible waste. |
| Area Sensitivity/ Biodiversity | There are no resident sensitive water column environmental receptors in the Operational Area. The volumes of putrescible waste, sewage and grey water discharged will be small and will be rapidly broken down.<br>Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3).<br>Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Storage of sewage, greywater and putrescible wastes and transportation to shore was considered as an alternative to ocean discharge. However, it would be excessively costly and impractical due to the lack of storage capacity onboard the support vessels and IV/MODU and would result in increased vessel transits to provide ship-to-shore services. Additional energy use and emissions associated with onshore transport and treatment would also be introduced, as well as potential impact on the ultimate receiving terrestrial environment. Therefore, there is no net environmental benefit of waste storage and transfer for onshore disposal. It also provides an increased exposure to biological health hazards, and safety hazards.

Deteriorating water quality and marine pollution are identified in relevant Recovery Plans and Conservation Advice (Table 4-3) as potential threats to a number of marine fauna species. Given the short duration of the Petroleum Activities Program in the Operational Area, the potential impacts associated with discharge of sewage, greywater and putrescible wastes are considered to be slight and not compromise the objectives set out in the Recovery Plans and Conservation Advice. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk is considered to be low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Potential impacts associated with discharge of sewage, greywater and putrescible wastes are acceptable and ALARP.

## 7.7 Plug & Abandonment, Field Management and Recovery of Equipment Discharges (Risk ID 7)

### 7.7.1 Summary of Environmental Impact

#### P&A Discharge

| Hazard | P&A Discharge | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | B | 1 | L |

#### Field Management Discharge

| Hazard | Field Management Discharge | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | B | 1 | L |

#### Flowline and Umbilical Cutting Discharge

| Hazard | Flowline and Umbilical Cutting Discharge | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | B | 1 | L |

#### Marine Growth Removal

| Hazard | Marine Growth Removal | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | A | 1 | L |
| Residual Risk | A | 1 | L |

#### Corrosion/breakdown of the Wellhead Resulting in a Release of Metals

| Hazard | Corrosion/breakdown of Wellhead Resulting in a Release of Trace Amounts of Metals | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | A | 1 | L |
| Residual Risk | A | 1 | L |

### 7.7.2 Description of Hazard

#### 7.7.2.1 Plug & Abandonment

Cementing operations will be undertaken to abandon selected wells. As detailed in Section 7.7.3.1, the following cement discharge to the marine environment may occur:

- at the surface (slurry) during cement unit testing, commissioning and cleaning operations cement
- at the seabed in the event unexpected WH/conductor movement is observed
- at the seabed if downhole cement plug is required to be drilled out.

Volumes discharged have been provided in Section 3.9 and are considered minor.

Excess dry bulk cement which is surplus to requirements of a P&A well will be retained and used on the next P&A well. At the end of the P&A campaign it will either be provided to the next operator or discharged to the marine environment.

P&A chemicals will be required to make kill fluid or cement slurry in order to place the permanent barriers. The use of additives for the brine would be minimal, as the fluid requires to provide the hydrostatic column only in order to hold off the reservoir fluid from coming to surface. In addition, low volumes of high viscosity WBM mud (up to 50 $m^3$) will be used per well to clean the hole or spot on bottom to support the placement of the cement slurry placement in the hole. Discharge will occur at sea-surface or within the water column. A maximum of 50 $m^3$ brine, which includes chemicals may be discharged per well. Effort will be made to leave all the brine/cement and high viscosity pills downhole.

During P&A, the tubing above the production packer will be retrieved. This will expose the outer surface of the tubing to the open environment. The outside of the tubing is expected to be free of oil due to the gas lift, however there is a possibility that < 0.5 $m^3$ of residual hydrocarbon may have accumulated around the tube, which could be lost to the marine environment during tubing retrieval. During the well killing operation, surfactants and cleaning solvents will be pumped into the well annulus to minimise the amount of oil attached to the outer surface of the tubing.

#### 7.7.2.2 Field Management

As described in Section 3.6, inorganic or organic acids may be required during field management activities, for tasks such as marine growth removal, approximately 200 L per operation (e.g. per soak for marine growth removal) is released to the marine environment.

The well tree caps will be cleaned onboard the support vessel using high-pressure water jets during field management (Section 3.6.4). This task will result in the generation of waste wash water containing the removed marine biota. It is estimated that 5 kilos of marine growth and wash water will be generated per tree cap. Cleaning will take place on a clean section of the support vessel deck. If required, a dilute acid (calcite wash) may also be used to remove marine growth. Wash water will contain seawater, dilute calcite wash, removed marine growth.

#### 7.7.2.3 Flowline and Umbilical Cutting

During equipment recovery, flowlines and umbilicals will be severed from subsea equipment (see Section 3.8.1), which will result in the contents being released to the marine environment.

The flowlines connected contain seawater treated with multi-function inhibitor, Hydrosure O-3670R, at a concentration of approximately 850 ppm and residual hydrocarbon concentrations (refer to Section 3.5.2 for volumes and concentrations).

#### 7.7.2.4 Marine Growth Removal

Marine growth from recovered subsea infrastructure will be removed on the vessel deck using a high pressure water and brushes. Removed marine growth will be discharged to the marine environment from the deck. Significant marine growth is not anticipated given significant marine growth has not been observed on infrastructure to date (refer to Section 3.5 for flowline and umbilical contents).

Marine growth removal may also occur subsea during field management (refer to Section 7.8 for risk assessment).

#### 7.7.2.5 Corrosion/breakdown of the Wellhead Resulting in a Release of Metals

Eni commissioned a degradation assessment (Atteris, 2021) on the breakdown of various subsea infrastructure within the Woollybutt field, including the wellheads. As presented in the assessment, the estimated time to the first perforation / complete loss of steel thickness due to external corrosion on the wellhead is 20 to 250 years. After a number of years, the wellheads may collapse to the seafloor under their own weight as the structural members lose their integrity. Table 7-10 presents the estimated breakdown of the CB1 wellhead and material sizes.

During the wellhead and guide base breakdown there will be an introduction of metals from the wellhead composition, such as iron, which the wellhead is predominately made of (refer Section 3.5.2.1). As the wellhead and guide base breakdown approximately 4,000 kg of metals could be released over the period of breakdown. The release of these metals has the potential to change the marine sediment in the immediate vicinity of the wellhead (refer Section 7.7.3).

**Table 7-10: Estimated Material Breakdown Outcomes –Wellheads (Atteris, 2021)**

| Material | Estimated Material Breakdown Size and Causing Event | | |
|---|---|---|---|
| | **Lower Bound Size** | **Upper Bound Size** | **Likely Size and Event** |
| Casing & Structural Steels | Small Corrosion Particles<br><1 mm<br>Steel corrosion products can be abraded off the structure by seabed movement | Pieces of Heavily Corroded Steel<br><15 cm<br>Heavily corroded pieces of steel may be released from the structure by impacts or uneven corrosion. Sections are likely to independently corrode in their new location. | Small and Moderate Flakes<br><5 cm<br>Dislodgement likely to be caused by abrasion, environmental loading, weight of marine growth and marine fauna activity. |

### 7.7.3 Potential Environmental Impact

#### 7.7.3.1 Cement

Cement discharge impacts to the marine environment are associated with smothering of benthic and/or infauna communities in the vicinity of the well. Cement is the most common material currently used in artificial reefs around the world (OSPAR, 2010) and is not expected to pose any toxicological impacts to benthic and/or infauna from leaching or direct contact.

Excess cement discharge will occur as a slurry. Slurry will likely settle on the seafloor closer to the well location. Once settled the cement may smother any surrounding benthic and/or infauna communities local to the well. Given the minor volumes of cement discharge, the low density and sensitivity of benthic fauna at the location (refer Section 1.2, Appendix C), impact will be localised, minor and short term only.

#### 7.7.3.2 Chemicals

Oceanic HW443 is a water based hydraulic fluid typically used during vessel / ROV operations and will be released from the umbilical during cutting. Oceanic HW443 is reported to have a low toxicity to the marine environment (see Table 7-11) and has been classified under the Offshore Chemical Notification Scheme (OCNS) as Class D, which represents a low toxicity (CEFAS, 2016). The chemical has been used widely in marine environments worldwide with no observed environmental effect (MacDermid, 2007).

**Table 7-11: Ecotoxicity test results for Oceanic HW443 hydraulic fluid (Source: RMT, 2003)**

| Toxicity Test | Test Flora/Fauna Group | Concentration |
|---|---|---|
| 72 $EC_{50}$ | Algae | 1,070 mg/L |
| 48hr $LC_{50}$ | Crustacean | > 10,000 mg/L |

$EC_{50}$: Effective concentration where 50% of the maximal effect is observed

$LC_{50}$: Lethal concentration at which 50% mortality from toxicity is observed

The release of this hydraulic fluid has the potential to result in a localised temporary reduction in water quality. Hydraulic oils are medium oils of light to moderate viscosity and behave similarly to marine diesel when in the marine environment, rapidly dissipating in ocean conditions.

Gyptron ST-4617 will be released from the umbilicals during cutting, albeit in very minor volumes (refer to Section 3.5.2 for volumes). This chemical is classified under the ChemAlert classification scheme as Amber, which indicates a Moderate hazard (RMT, 2008). It is considered to have a low to moderate toxicity (RMT, 2008). Gyptron has a high water solubility and is not considered to have potential for bioaccumulation in aquatic organisms (NICNAS, 2010).

Hydrosure O-3670R will be released from the flowlines during cutting. The chemical is classified under the OCNS as Gold, which represents a low hazard group of chemicals used in the offshore industry. Although Hydrosure O-3670R contains a substance which is very toxic to aquatic organisms (quaternary ammonium chloride), the concentration is relatively low (10 - 30% (Champion Technologies, 2010) within the chemical as a whole.

Given the low volumes and toxicity of chemicals discharged, the low density and sensitivity of benthic fauna at the location (refer Section 1.2, Appendix C) and the rapid dispersion of the chemical in the marine environment, no lasting impact is anticipated.

#### 7.7.3.3 Residual Hydrocarbons

Residual hydrocarbons concentrations, rapidly disperse in the water column and are generally below threshold levels for acute toxic effects. Hydrocarbon concentration within the flowlines are presented in Section 3.5.2. It is expected that residual hydrocarbons will disperse rapidly on release to the water column and toxicity effects to benthic fauna are not expected, particularly given the low sensitivity of the immediate environment (refer Section 1.2, Appendix C).

Given the low predicted release volumes and rapid dilution of chemicals and residual hydrocarbons in the marine environment, impacts to marine fauna are highly unlikely. Marine fauna in the open water environment are also highly mobile transient species, therefore it is highly unlikely they will be exposed to the releases for periods long enough to cause toxicity impacts. Give the low volumes that may be released (refer Section 3.5.2) no impacts to marine fauna are anticipated and water quality in the vicinity of the release will rapidly return to normal.

#### 7.7.3.4 Marine Growth

Marine growth discharge from the vessel is not anticipated to be significant given the marine growth observations on the subsea infrastructure made to date (refer to Section 3.5). The marine growth discharged from the vessel deck may float or sink to the seabed causing localised disturbance.

Given the minor quantities of discharges, short and infrequent discharge durations and high dispersion in the open, offshore environment, any impacts on the marine environment from the marine growth discharges are expected to be slight. Recovery of water quality conditions is expected to be rapid.

#### 7.7.3.5 Release of Metals from the Wellhead

As detailed in the Woollybutt Degradation Assessment (Atteris, 2021), the estimated time to the first perforation / complete loss of steel thickness due to external corrosion is 20 to 250 years for a wellhead. Small corrosion particles (<1 mm) (Table 7-10) are likely to be subject of the hydrodynamic processes at the seabed and disperse over the wider seabed area, resulting in detection of contaminant from the wellhead unlikely, particularly in the short term.

Larger flake pieces and pieces of steel (refer Table 7-10) will settle in the immediate vicinity of the wellhead and will likely independently corrode in their new location into smaller particles, some of which will disperse over the wider seabed and some of which will become part of the seabed as they bury.

In the longer term (20-250 years) as the breakdown of the wellhead is more extensive, monitoring may detect elevated levels of iron (in various sized particles, refer to Table 7-10) on the seabed in the immediate vicinity of the wellhead. Whilst these pieces break down further over time, a small portion of finer pieces will be bioavailable only to the infauna present. In addition, iron is not toxic to marine organisms except at extremely high concentrations (Grimwood and Dixon 1997) and is an OSPAR PLONOR component. Given the slow breakdown and the hydrodynamic processes taking place on the seabed, levels of iron in sediments at the wellhead are not anticipated to reach a level at any one point during the breakdown process that will have lasting impact to infauna and epifauna.

The seabed at the wellhead does not present any significant epibenthic flora and fauna. As presented in Section 1.2.1 of Appendix C, the overall the density of sessile fauna is low, with the larger organisms (feather stars, soft corals and fan corals estimated to occur at a density of approximately 1 per 10 m² for crinoids to 1 per 100 m² for soft corals and less for other species. Burrows, occupied by shrimp and gobioid fish, occurred more frequently, but patchily, with a density estimated at between 1 and 5 /m², while small worm tubes were more common. (URS, 2001). Given the low density of epibenthic fauna, it is anticipated that only a low number of individuals will be exposed to the increased iron levels at the seabed from the degrading wellhead and no lasting detectable impact is anticipated on the infauna community.

### 7.7.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- routine chemical discharges are ALARP and acceptable (EPO-8).

Control Measures relating to this risk include:

- chemical selection process (Section 3.9) is followed (CM-13)

- excess dry bulk cement which is surplus to requirements of a P&A well will be retained and used on the next P&A well. At the end of the P&A campaign it will either be provided to the next operator or discharged to the marine environment (CM-14).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 7.7.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption** |
| Eliminate | Eliminating tree cleaning wastewater discharge | Cleaning is required to allow inspection and verification of the integrity of the subsea trees, and therefore cannot be eliminated. | × |
| | Retain and use excess dry bulk cement on the next P&A well | Excess dry bulk cement which is surplus to requirements of a P&A well will be retained and used on the next P&A well. At the end of the P&A campaign it will either be provided to the next operator or discharged to the marine environment. | ✓ |
| | Eliminating P&A chemical discharge | Cement, mud and P&A and intervention chemicals are necessary for the P&A of a well. While not routinely planned, the discharge of small volumes cannot be eliminated due to onboard storage and additional transport and disposal costs. | × |
| | Eliminating umbilical and flowline contents discharge | It is possible to cap the flowline and umbilicals once cut. The contents of the flowlines and umbilicals will then remain contained and not impact the marine environment. However:<br>1. In the event that the flowlines and umbilicals are recovered to a vessel at a later date the contents must be discharged as the equipment cannot be reeled to the vessel deck with its contents.<br>2. In the event that the flowlines and umbilicals are not recovered at a later date the contents would eventually seep out as the flowlines and umbilicals degrade.<br>Discharging the contents of the flowlines once cut allows for a range of possible decommissioning options at a later date. In addition, given the low volume and negligible consequence of the discharge to marine environment it is not considered that capping the flowlines provides any significant environmental benefit. | × |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption** |
| | Removal of Corkybark-1 wellhead | The removal of Corkybark-1 wellhead has been addressed in Section 3.5.1.4, with the leave in-situ option providing an equal or better environmental outcome. | × |
| Substitute | N/A | N/A. | N/A |
| Engineering | Storage of excess cement, mud and P&A and intervention brine on IV/MODU or support vessels | Storage of excess cement, mud and P&A and intervention brine on IV/MODU and support vessels and transportation to shore is impractical due to the high volume and number of vessels that would be required to provide ship to shore services. Additional energy use and emissions associated with onshore transport and treatment would also be introduced, as well as potential impact on the ultimate receiving terrestrial environment. Therefore, there is no net environmental benefit of transfer for onshore disposal. It also provides an increased exposure to biological health hazards, and safety hazards such as bulk transfer and heavy lifting operations. | × |
| Isolation | N/A | N/A. | N/A |
| Administrative | Chemical Selection | The chemical used for the tree cleaning (if required) and P&A activities will be assessed under the Eni Chemical Assessment Process (see Section 3.9). This will ensure that the selected chemical is ALARP and acceptable for use. Environmental benefits outweigh the minor administrative cost involved in implementing and selecting the chemical. | ✓ |
| | Water quality and/or sediment monitoring of cement or WBM fluids to verify impact during activity | No environmental benefit would be gained by implementing monitoring during the activity. However, can be used to understand if any impact has occurred.<br>Cost/sacrifice of monitoring (e.g. vessel use, time, personnel) outweighs benefit to be gained in the context of existing environment. | × |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption** |
| | Monitoring program to assess any changes in seabed, sediment and settlement of marine organisms on the CB1 wellhead | An ROV would need to be deployed from a vessel to conduct the monitoring activity. As such, the activity introduces health and safety risk to personnel and additional environmental risks (vessel and ROV based risks, disturbance to seabed).<br>Whilst in the longer term (20-250 years) the breakdown of the wellhead is more extensive, monitoring in the shorter term (<20 years) may detect elevated levels of iron (in various sized particles, refer to Table 7-10) on the seabed in the immediate vicinity of the wellhead. Whilst these pieces breakdown further over time, a small portion of finer pieces will be bioavailable only to the infauna present. In addition, iron is not toxic to marine organisms except at extremely high concentrations (Grimwood and Dixon 1997) and is an OSPAR PLONOR component. Given the slow breakdown and the hydrodynamic processes taking place on the seabed, levels of iron in sediments at the wellhead are not anticipated to reach a level at any one point during the breakdown process that will have lasting impact to infauna and epifauna.<br>The seabed at the wellhead does not present any significant epibenthic flora and fauna. As presented in Section 1.2.1 of Appendix C, the overall the density of sessile fauna is low, with the larger organisms (feather stars, soft corals and fan corals estimated to occur at a density of approximately 1 per 10 m² for crinoids to 1 per 100 m² for soft corals and less for other species. Burrows, occupied by shrimp and gobioid fish, occurred more frequently, but patchily, with a density estimated at between 1 and 5 /m², while small worm tubes were more common. (URS, 2001). Given the low density of epibenthic fauna, it is anticipated that only a low number of individuals will be exposed to the increased iron levels at the seabed from the degrading wellhead and no lasting detectable impact is anticipated on the infauna community.<br>Given the above, there is limited environmental benefit (information) to be gained from monitoring around the CB1 wellhead. | × |

### 7.7.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | The Petroleum Activities Program is in compliance with EPBC 2001/365 approval.<br>Eni Chemical Assessment Process (Section 3.9).<br>Prior to permanently leaving any structure in-situ, Eni will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to P&A, field management and recovery of equipment discharges. |
| Area Sensitivity/ Biodiversity | Benthic fauna are most at risk of potential impacts from cement. As the benthic fauna present in the operational area are widely represented in the NWS no significant impacts are expected.<br>Given the minor quantities of discharges, short and infrequent discharge durations and the low toxicity and high dispersion in the open, offshore environment, any impacts on the marine environment from discharges are expected to be slight.<br>Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Additional controls such as onboard storage and disposal of fluids released were considered but the logistics and costs involved would be grossly disproportionate to the environmental benefits given the low impacts expected. Other control measures such as not using chemicals or capping the flowline are not feasible. The Eni chemical risk assessment process (Section 3.9) will ensure any impact from chemical discharge is ALARP and acceptable.

Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). Recovery Plans and Conservation Advice objectives will not be compromised. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk is considered low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Potential impacts associated with P&A, field management and recovery of equipment discharges are acceptable and ALARP. The leave in-situ decommissioning of the Corkybark-1 wellhead has been determined ALARP and environmentally acceptable.

## 7.8 Seabed Alteration (Risk ID 8)

### 7.8.1 Summary of Environmental Impact

#### ROV Use

| Hazard | Seabed Disturbance (ROV) | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | E | 1 | L |
| Residual Risk | E | 1 | L |

#### Subsea Equipment Removal

| Hazard | Subsea Equipment Removal | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | E | 1 | L |
| Residual Risk | E | 1 | L |

#### Wet-Park of Subsea Infrastructure

| Hazard | Wet-park of Subsea Infrastructure | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | E | 1 | L |
| Residual Risk | E | 1 | L |

#### Marine Growth Removal

| Hazard | Marine Growth Removal | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | E | 1 | L |
| Residual Risk | E | 1 | L |

#### Corkybark-1 Wellhead Remaining In-situ Permanently Altering the Seabed

| Hazard | Corkybark-1 Wellhead Remaining In-situ Permanently Altering the Seabed | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | E | 1 | L |
| Residual Risk | E | 1 | L |

**MODU Mooring**

| Hazard | MODU mooring | | |
|---|---|---|---|
| | **Frequency** | **Severity** | **Risk** |
| Inherent Risk | E | 1 | L |
| Residual Risk | E | 1 | L |

## 7.8.2 Description of Hazard

### 7.8.2.1 Remotely Operated Vehicle

Where ROV use during field management or P&A activities is required. The ROV may station on the seabed for short periods if required. The footprint of a typical ROV is approximately 2.5 m by 1.7 m.

Where an IV/MODU is used for P&A, anchoring would not be required except potentially in emergency circumstances. Support vessels are also not expected to anchor in the Operational Area.

### 7.8.2.2 Subsea Equipment Removal

Equipment recovery preparation activities may include relocating sediment that has built up around subsea infrastructure (e.g. around the DSPM and mid-depth buoy gravity bases).

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 and will result in localised disturbance where at the site where sediment is relocated.

### 7.8.2.3 Wet-Park of Subsea Infrastructure

As described in Section 3.8.6, wet-parking of subsea equipment on the seabed maybe required in the event of issues arising during recovery operations. In some circumstances it the subsea equipment will be required to be lowered to the seabed for a period until it can be removed. The area of impact will be determined by the infrastructure size and will be highly localised.

### 7.8.2.4 Marine Growth Removal

Field management activities (e.g. anode installation and debris cap removal) may require removing marine growth from the subsea infrastructure using an ROV at the seabed. Removing marine growth may be done in various ways. Those that have the potential to impact the seabed include use of high-pressure water and/or brushes on ROVs. Any disturbance will be highly localised to the immediate seabed around the infrastructure.

Marine growth may also be removed on the vessel as risk-assessed in Section 7.7.3.4.

#### 7.8.2.5 Corkybark-1 Wellhead Remaining In-situ Permanently

The physical presence of the CB1 wellhead and guide base remaining in-situ permanently has the potential to result in disturbance to the seabed and benthic habitats in the following ways:

1. Altering hydrodynamic conditions around the wellhead, potentially resulting scouring and accretion.

2. Introduction of hard substrate resulting in the creation of a new habitat.

#### 7.8.2.6 MODU mooring

In the event a MODU is used for P&A, it will be moored at each well location. The area of seabed impact / disturbance is limited to the footprint of the anchor and chain.

Seabed disturbance will result from the anchor holding testing and MODU anchor mooring system, including placement of anchors and chain/wire on the seabed, potential dragging during tensioning and recovery of anchors. Overall, the mooring of the MODU and anchor holding testing activities will result in localised, small scale seabed disturbance to the seabed. Mooring may require a 12 point mooring system at each well location.

The predicted maximum spatial extent of seafloor that could be disturbed at each well during MODU mooring includes:

- Anchor drag: approximately 10 m x 50 m (allowing for up to 50m drag per anchor, depending on soil, anchor type and deployment method). A total disturbance area of 6 $km^2$, per well, based on 12 anchors dragging 50 m. This level of anchor drag is expected and cannot be avoided in hold testing/normal ops but unplanned drag due to loss of station keeping is included in Section 8.9.
- Chain on seabed: approximately 400 – 1200 m per line depending on line tensions and mooring analysis, and can be adjusted as per site conditions.

### 7.8.3 Potential Environmental Impact

As the benthic fauna in the Operational Area are expected to be widely represented on the shelf (refer Section 1.2.1 of Appendix C), seabed disturbance, described in the above Sections, is not expected to result in widespread loss or degradation of environmentally significant habitats. Due to the localised area of disturbance, impacted benthic communities are expected to rapidly recolonise any damaged areas (Currie & Isaacs, 2004).

Increased suspended sediment in the water around the subsea equipment may occur during removal activities and settle in the vicinity of the subsea equipment. Any sedimentation will be localised and smothering effects are not anticipated.

The Ancient Coastline at 125 m Depth Contour KEF overlaps the Operational Area in the outmost north west corner. Seabed disturbance activities are not planned to occur on the KEF, therefore no impact is anticipated.

#### 7.8.3.1 Scouring and Accretion Around Wellhead

The presence of the CB1 wellhead and guide base on the seafloor interacts with the hydrodynamic conditions in close proximity, potentially resulting in an alteration of the seabed (scouring and accretion processes) which may impact associated benthic habitats. As presented in Figure 3-5 to Figure 3-8 and detailed in the September 2020 survey of the CB1 wellhead and guide base, no scour was observed, with the guide base approximately 0.15m above the surrounding seabed on all four faces.

The seabed at the wellhead does not present any significant epibenthic flora and fauna. As presented in Section 1.2.1 of Appendix C, the overall the density of sessile fauna is low, with the larger organisms (feather stars, soft corals and fan corals estimated to occur at a density of approximately 1 per 10 m² for crinoids to 1 per 100 m² for soft corals and less for other species. Burrows, occupied by shrimp and gobioid fish, occurred more frequently, but patchily, with a density estimated at between 1 and 5 /m², while small worm tubes were more common. (URS, 2001).

Given that low environmental sensitivity, no significant impacts to benthic communities are expected.

#### 7.8.3.2 Habitat Creation at Wellhead

As presented in Figure 3-5 to Figure 3-8 and detailed in the September 2020 survey of the CB1 wellhead and guide base, marine growth coverage on the CB1 wellhead and guide base was approximately 100%: 40% hard and 80% soft growth.

The presence of fish assemblages on wellheads is strongly influenced by depth, age and height of the structures. Wellheads in the NWS at depths between 82 and 135 m have been observed to sustain full populations of *P.rubrizonatus* from juveniles through to adults (Fowler and Booth, 2012). Reef dependant and transient pelagic species have also been observed at wellheads in the NWS (Pradella et al. 2014; McLean et al. 2018).

Given the otherwise featureless seabed in the vicinity of the wellhead, the presence of the wellhead provides a hard substrate habitat that has the potential to attract fish assemblages.

### 7.8.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- seabed disturbance limited to the Operational Area (EPO-9).

Control Measures relating to this risk include:

- Mooring Analysis Design be undertaken and implemented (CM-35).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 7.8.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate ROV use | The ROV is required for the activities. Without the use of the ROV, well inspection activities cannot be undertaken. | × |
| | Eliminate equipment removal | Leaving the equipment in-situ has been investigated. The base case is to remove subsea equipment at the end of field life. As per Section 3.8. | × |
| | Eliminate sediment relocation | Sediment relocation is required to safely remove the equipment. The sediment relocation is limited to the immediate area of the infrastructure. It is not feasible to eliminate the sediment relocation. | × |
| | Removal of Corkybark-1 wellhead | The removal of Corkybark-1 wellhead has been addressed in Section 3.5.1.4, with the leave in-situ option providing an equal or better environmental outcome. | × |
| | Eliminate MODU mooring | Allowance for IV or MODU use has been included to allow operational flexibility to conduct P&A in accordance with the schedule (Section 3.4). In the event a suitable IV cannot be contracted to complete the activities within the schedule, then a moored MODU may be required.<br>Should a MODU be selected, it is technically not feasible to use DP to conduct the P&A, therefore, mooring is required. | × |
| Substitute | N/A | N/A | N/A |
| Engineering | N/A | N/A | N/A |
| Isolation | N/A | N/A | N/A |
| Administrative | A mooring analysis will be undertaken to determine the suitable mooring systems for the sea state and location. | The seabed in the area is largely featureless and devoid of significant benthic habitat.<br>The mooring analysis will ensure anchors will be clear of any significant features or structures. | ✓ |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Monitoring program to assess any changes in seabed, sediment and settlement of marine organisms on the CB1 wellhead | Refer Section 7.7.5 | ✖ |

### 7.8.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Not applicable.<br>Prior to permanently leaving any structure in-situ, Eni will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to seabed disturbance. |
| Area Sensitivity/ Biodiversity | Benthic fauna are most at risk of potential impacts from the seabed disturbance. As the benthic fauna present in the operational area are widely represented in the NWS and the disturbance footprint is minor, no significant impacts are expected. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Due to the small disturbance area and the field infrastructure being located in an area of low benthic diversity (Refer Section 1.2 of Appendix C), the residual risk of seabed disturbance is considered low which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). Potential impacts are acceptable and ALARP. The leave in-situ decommissioning of the Corkybark-1 wellhead has been determined ALARP and environmentally acceptable.

# 8 UNPLANNED EVENTS

## 8.1 Introduction of Marine Pest Species (Risk ID 9)

### 8.1.1 Summary of Environmental Impact

| Hazard | Introduction of Marine Pest Species | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | C | 4 | H |
| Residual Risk | A | 4 | M |

### 8.1.2 Description of Hazard

The activities that have the potential to result in the introduction of Invasive Marine Species are:

- discharges of vessel ballast water containing foreign species
- translocation of species through biofouling of vessel hull or niches (e.g. sea chests, bilges or strainers)
- translocation of species on submerged equipment such as ROV
- removal of marine growth during field management activities.

Support vessels will be sourced locally, within Australian waters; however, the IV/MODU may be sourced from international waters.

Vessel and IV/MODU activity is not constant within the Operational Area and IMS risk is therefore limited for periods relating to that specific activity (e.g. duration of field management activities or P&A, etc.).

Vessels will ballast and de-ballast to improve stability, spread vessel stresses and adjust vessel draft, list and trim, with regard to the weight of equipment, fuel and potable water on board at any time. Ballast water may contain organisms such as fish, invertebrate larvae and phytoplankton from foreign source waters.

Similarly, despite the use of antifouling systems, there will inevitably be some degree of hull fouling on the vessel(s). Anti-fouling paints are used to coat the bottoms of IVs and vessels to prevent marine organisms such as algae and molluscs attaching themselves to the hull – thereby slowing down the ship and increasing fuel consumption.

### 8.1.3 Potential Environmental Impact

Non-endemic marine species transported into areas where they have not previously been found can displace native species, or interfere with ecosystem processes in other ways (e.g. through predation).

The successful establishment of an exotic species transported via either ballast or hull-fouling depends primarily on three factors:

1. colonisation and establishment of the marine pest on a vector (vessel, equipment or structure) in a donor region (e.g., a home port, harbour or coastal project site where a marine pest is established)
2. survival of the marine pests on the vector during the voyage from the donor to the recipient region
3. colonisation (for example, by reproduction or dislodgement) of the recipient region by the marine pest, followed by successful establishment of a viable new local population.

The deep offshore open waters of the Operational Area are not conducive to the settlement and establishment of IMS. The Operational Area is in water depths of approximately 100 m, precluding light penetration to the seabed, distant from any coastline (> 30 km) and more than 12 NM from shorelines and/or critical habitat. The likelihood that any marine organisms could become established at the field is rare.

### 8.1.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no introduction of marine pest species to Australia from the activities (EPO-10)

Control Measures relating to this risk include:

- implementation of an IMS risk assessment tool, applied to IV/MODU and support vessels (CM-15)
- IV/MODU and support vessels have approved ballast water treatment method/system (CM-16)
- IMS Management Methods applied to IV/MODU and support vessels (CM-17).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.1.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Do not use vessels or IV | The use of vessels and IV/MODU is unavoidable; therefore, the risk of exotic species being transported in ballast water or hull fouling cannot be completely eliminated. | ✓ |
| | Do not exchange ballast | Exchange of ballast water is a safety-critical activity for marine operations and elimination of exchange could put the vessel at risk. | ✓ |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Substitute | Contract only local and IV | Contract IV/MODU only operating in local, State or National waters to reduce potential for IMS; however, may present significant costs and delay in activity schedule. | × |
| | Alternative ballast system which does not require a discharge | Utilising an alternative ballast system to avoid uptake/discharge of water would reduce the requirement for ballast water exchange; however, sourcing such vessels may present significant costs and delay in activity schedule and ballast water exchange is standard practice on many vessels. | × |
| Engineering | Heat treatment of ballast water to eliminate IMS | Would reduce potential for IMS to establish by eliminating individuals present in ballast water; however, discharge of water at much higher temperature than surrounding marine environment would likely result in death of native marine species. | × |
| Isolation | N/A | N/A. | N/A |
| Administrative | Dry-docking prior to entering field to clean vessel and/or equipment and remove biofouling | Would minimise risk of IMS; however, presents significant cost and would lead to scheduling delays. Would be considered only to reduce IMS risk level. | × |
| | Implementation of an IMS risk assessment tool, applied to IV/MODU and vessels | Ensures vessels IV/MODU are assessed to low IMS risk before mobilising for the activity. Minimal cost involved in demonstrating IV/MODU and vessel(s) are of 'low risk' of introducing IMS through completion of an IMS risk assessment. Additional controls (e.g. dry docking) would be considered based on the outcome of the IMS risk assessment. | ✓ |
| | IV/MODU and support vessels have approved ballast water treatment method/system | Eni will adopt the *Biosecurity Act 2015* and Australian Ballast Water Management Requirements 2017 (DAWR). Pursuant to the requirements:<br>Support vessel and IV/MODU carrying ballast water and engaged in international voyages shall manage ballast water in accordance with a Ballast Water Management Plan so marine pest species are not introduced. Requirements also include:<br>1. Vessels carrying internationally sourced ballast water must conduct | ✓ |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | | ballast water exchanges as far as possible from the nearest land, which is:<br>• at least 12 nautical miles from the nearest land, and in water greater than 50 metres deep<br>• where possible, more than 200 NM miles from the nearest land and in water greater than 200 metres deep<br>• no closer than 500 metres from the offshore installation.<br>2. Ballast water exchange must be conducted to the equivalent of a 95 per cent (or greater) volumetric exchange, using one of the acceptable methods under the Regulations.<br>3. Vessels constructed on or after 8 September 2017 will be required to meet the Regulation D-2 discharge standard from the date they are put into service.<br>4. Vessels constructed before 8 September 2017 will need to comply with the Regulation D-2 standard by either the first or second five-year renewal survey of the vessel associated with the International Oil Pollution Prevention Certificate under MARPOL Annex I.<br>*Note:*<br>*The D-2 standard specifies that discharge ballast water that meets the following criteria:*<br>• *less than 10 viable organisms per cubic metre which are greater than or equal to 50 micrometres in minimum dimension;*<br>• *less than 10 viable organisms per millilitre which are between 10 micrometres and 50 micrometres in minimum dimension;*<br>• *less than 1 colony-forming unit (cfu) per 100 millilitres of Toxicogenic Vibrio cholerae;*<br>• *less than 250 cfu per 100 millilitres of Escherichia coli; and*<br>• *less than 100 cfu per 100 millilitres of Intestinal Enterococci.* | |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | | Eni will implement the Australian Ballast Water Management Requirements 2017 (DAWR), which is a legal requirement. Pursuant to the requirements:<br>• Vessels/IV/MODU must carry a valid ballast water management plan.<br>• Vessels/IV/MODU will have ballast water management certificate (unless exemption has been granted).<br>• Vessels/IV/MODU with a ballast water management system (BWMS) will carry a Type Approval Certificate specific to the type of BWMS.<br>• Vessels/IV/MODU will maintain a complete and accurate record of all ballast water movements. | ✓ |
| | IMS Management Methods applied to IV/MODU and support vessels | IMS management measures will be applied to IV/MODU and support vessels according to risk to minimise the likelihood of IMS being introduced (such as the treatment of internal systems, IMS Inspections or cleaning). | ✓ |

### 8.1.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Compliance with:<br>• Australian Ballast Water Requirements-Version 7 (Department of Agriculture and Water Resources, 2017)<br>• International Maritime Organisation's Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species<br>• Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships<br>• *Biosecurity Act 2015*<br>• Fish Resources Management Regulations 1995<br>• WA DPIRD Biofouling and Biosecurity Policy.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to the introduction of marine pest species have been raised. |

| Demonstration of Acceptability | |
|---|---|
| Area Sensitivity/ Biodiversity | The main risks associated with the introduction of marine pest species are the displacement native species or interference with ecosystem processes in other ways (e.g. through predation). Provided the biosecurity controls are implemented during the activities, the risk of introduction of marine pest species is deemed low.<br>The deep offshore open waters of the Operational Area are not conducive to the settlement and establishment of IMS. The Operational Area is in water depths of approximately 100 m, precluding light penetration to the seabed, distant from any coastline (> 30 km) and more than 12 nm from shorelines and/or critical habitat. The likelihood that any marine organisms could become established at the Operational Area is rare. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Surface cleaning of all vessel hulls at a licensed vessel maintenance facility was considered but is not warranted, given the management measures in place and the low risk from IMS.

The use of vessels and IV/MODU cannot be reduced, as they are required to undertake the activities.

An IMS risk assessment process is undertaken on all vessels and IV/MODU prior to contracting to ensure vessel IMS risk is 'low'. All vessels are required to provide Australian biosecurity documentation as part of pre-hire documentation. Pre-hire vessel audits are also undertaken, including checking recent movements, anti-fouling coating, internal cleaning and compliance against the Australian Ballast Water Requirements – Version 7 and the International Maritime Organisation's Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species.

The assessment is designed to reduce the likelihood of transferring IMS and support ongoing effective management of vessel biofouling, encourage best practice, and may also provide evidence to support a defence to any change under the *Fish Resources Management Act 1994* (FRMA). Factors affecting the risk output from the assessment tool include:

- presence and age of antifouling coating
- recent inspection, cleaning and treatment for Invasive Marine Species
- seawater pipework treatment
- duration of stay in interstate and overseas location
- vessel movements and history
- date of departure from last Port of Call.

IV/MODU and vessels are to be assessed prior to contracting. IMS management measures may be applied to ensure vessels and IV/MODU are at 'low risk' of introducing IMS as per the assessment. These may include measures such as:

- recoating of antifouling coating
- inspection (biofouling inspector considered suitably qualified by the Department), Cleaning and Treatment for Invasive Marine Species
- seawater pipework treatment.

Pursuant to the *Biosecurity Act 2015* and Australian Ballast Water Management Requirements 2017 (DAWR), support vessels carrying ballast water shall manage ballast water in accordance with a Ballast Water Management Plan so that marine pest species are not introduced. Pursuant to the Australian Ballast Water Management Requirements 2017 (DAWR):

- All vessels must carry a valid ballast water management plan.
- Vessels will have ballast water management certificate (unless exemption has been granted).
- Vessels with a ballast water management system (BWMS) will carry a Type Approval Certificate specific to the type of BWMS.
- Vessels will maintain a complete and accurate record of all ballast water movements.

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk is considered medium, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Therefore, the risk associated with the introduction of marine pests is acceptable and ALARP.

## 8.2 Accidental Loss of Non-Hazardous and Hazardous Waste (including Naturally Occurring Radioactive Materials) (Risk ID 10)

### 8.2.1 Summary of Environmental Impact

**Loss of Non-Hazardous and Hazardous Waste**

| Hazard | Non-Hazardous and Hazardous Waste | | |
|---|---|---|---|
| | Frequency | Severity | Frequency |
| Inherent Risk | B | Inherent Risk | B |
| Residual Risk | A | Residual Risk | A |

**Loss of NORMs from Recovered Equipment**

| Hazard | Loss of NORMs | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | A | 1 | L |
| Residual Risk | A | 1 | L |

### 8.2.2 Description of Hazard

#### 8.2.2.1 Accidental Loss of Non-Hazardous and Hazardous Waste

Generated solid wastes may be broadly classified into one of two categories:

1. general non-hazardous solid wastes
2. hazardous wastes.

Non-hazardous solid wastes produced on support vessels and IV/MODU include cardboard, plastic, aluminium and paper. These waste materials will be stored on board the support vessels in suitable containers (segregated from hazardous waste materials) for transport back to shore for disposal/recycling in accordance with local regulations.

Hazardous wastes are defined as being waste materials that are harmful to health or the environment. Chemicals and other hazardous materials that may be stored on the vessels include:

- lubricating oils, cleaning and cooling agents
- oil filters and batteries
- oily rags
- paint, aerosol cans
- acids/caustics and solvents.

All hazardous waste generated will be documented and tracked, segregated from other waste streams and stored in suitable containers. Recyclable hazardous wastes, such as oils and batteries, will be stored separately from non-recyclable materials. All

hazardous waste materials will be transported to shore for disposal or recycled at an approved facility in accordance with local requirements.

#### 8.2.2.2 Accidental Loss of Normally Occurring Radioactive Materials from Recovered Equipment

NORMs may be present on the recovered manifolds (see Section 3.5.2). Once on board the vessel this equipment will be checked for NORMs and if present, segregated from other waste as per a NORMs Management Plan. All NORMs material will be transported to shore for disposal at an approved facility in accordance with local requirements.

### 8.2.3 Potential Environmental Impact

No discharge of non-hazardous or hazardous waste (including NORMs) to sea is planned during Petroleum Activities Program. Potential impacts of solid waste discharge to sea include potential physical harm to marine fauna resulting from ingestion or entanglement with solid waste (garbage).

If accidentally lost overboard, hazardous waste would result in a temporary and highly localised hazardous water quality zone. This could have a toxic effect on marine fauna that are present within this zone. The exposure and toxicity would be highly temporary due to rapid dilution and dissipation in the marine environment expected on the NWS. Potential impacts are likely to be limited to one or a few individual marine animals in the immediate vicinity of the accidental release site, with the most likely fauna affected being those within the surface waters.

### 8.2.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no unplanned releases of solid hazardous or non-hazardous waste to the marine environment (EPO-11).

Control Measures relating to this risk include:

- hazardous and non-hazardous waste management processes are implemented (CM-18).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.2.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate production of non-hazardous and hazardous waste | Eliminates the risk release of non-hazardous solid to the marine environment; however, eliminating the use of consumable products is not possible due to operational requirements; waste will therefore be generated.<br>The use of vessels and IV/MODU (which generate waste) is required to perform the Petroleum Activities Program and therefore risk cannot be eliminated. | × |
| Substitute | N/A | N/A. | N/A |
| Engineering | N/A | N/A. | N/A |
| Isolation | Hazardous and non-hazardous waste will be segregated as per in accordance with Marine Order 95 | Securely segregating and isolating the hazardous and non-hazardous waste in accordance with Marine Order 95 will reduce the likelihood of it being lost to the marine environment.<br>Minor cost involved in segregating the hazardous and non-hazardous waste. | ✓ |
| | NORMs waste/ equipment will be segregated in accordance with an offshore NORMs Management Plan | Will isolate the NORMs waste and eliminate cross-contamination and loss of the waste to the marine environment.<br>Minor cost involved in segregating the NORMs waste. | ✓ |
| Administrative | Implement a hazardous and non-hazardous waste management process in accordance with Marine Order 95 | Reducing the risk of impact to the environment from loss of hazardous and non-hazardous waste outweighs the personnel cost associated with implementing procedures. | ✓ |

### 8.2.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Compliance with MARPOL 73/78 Annex V (Prevention of pollution by garbage/ Marine Order 95 (Marine pollution prevention – garbage) as required by vessel class.<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to unplanned waste discharge. |
| Area Sensitivity/ Biodiversity | Impacts are limited to a few individual marine fauna in the immediate vicinity of the accident release site.<br>Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). However, with controls in place the objectives of Recovery Plans and Conservation Advice will be met. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). However, with controls in place the objectives of the plans and advice will be met.

Hazardous materials are required for the safe and efficient operation of machinery and cannot be eliminated or substituted. The residual risk ranking for non-hazardous and hazardous waste is low. This is acceptable in accordance with Eni's acceptability criteria (Table 6-3). A number of controls have been evaluated above in accordance with the ALARP criteria (Section 6.3.1). Given the short duration of the activity the low potential risk and the controls that will be implemented, Eni considers that the risks associated with hazardous and non-hazardous waste are acceptable and managed to ALARP.

## 8.3 Vessel Collision with Marine Fauna (Risk ID 11)

### 8.3.1 Summary of Environmental Impact

| Hazard | Non-Hazardous and Hazardous Waste | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 2 | L |
| Residual Risk | A | 1 | L |

### 8.3.2 Description of Hazard

There is the potential for vessels to collide with marine fauna including cetaceans, fish, marine reptiles and seabirds during the Petroleum Activity Program. The main collision risk associated with the Petroleum Activities Program is through vessel collision with large, slow moving cetaceans; potentially resulting in severe injury or mortality.

Field management will be conducted from a support vessel. Field management schedule and duration is provided in Section 3.4.2.

For P&A activities and recovery of subsea equipment activities, a maximum of three support vessels may be in the Operational Area at any one time supporting the IV/MODU. P&A and recovery of subsea equipment activities schedule and duration is provided in Section 3.4.2.

### 8.3.3 Potential Environmental Impact

Vessel collision with marine fauna may result in injury or death of marine fauna. Marine fauna that are present in surface waters such as marine turtle and cetaceans are most susceptible to vessel strikes due to their proximity to the vessel (hull, propeller or equipment).

The Operational Area is within a BIA for:

- pygmy blue whale –distribution
- humpback whale – migration
- flatback turtle – internesting buffer and suitable mating habitat
- whale shark – foraging including high density prey.

All five species of turtle may pass through the Operational Area (Section 3.3), and the Operational Area overlaps with the BIA for the flatback turtle (internesting buffer and suitable mating habitat). It is possible individual turtles may be encountered during the Petroleum Activities Program; however, considering the water depths of the Operational Area compared to observed water depths of internesting turtles, large numbers of the species are not expected. Marine turtles on the sea surface have also been observed avoiding approaching vessels by typically moving away from the vessels track (Hazel *et al*., 2007).

Marine mammals that may occur within the Operational Area are detailed in Section 4.3.

The most commonly sighted whale in continental shelf waters of the region is the humpback whale and a BIA for humpback whale migration overlaps the Operational Area. The humpback whale is expected to be the most frequently encountered cetacean in the Operational Area, particularly during annual migrations. Cetaceans including humpback whales demonstrate a variety of behaviours in response to approaching vessels (attributed to vessel noise), including longer dive times and moving away from the vessel's path with increased speed (Baker & Herman, 1989; Meike *et al.,* 2004). These behaviours may contribute to reducing the likelihood of an interaction.

Pygmy blue, sei, fin, sperm whale and southern right whales may also transit through the Operational Area and a pygmy blue whale BIA for distribution overlaps the Operational Area. Although it is unlikely there will be significant numbers of these species encountered, there is still the potential for interaction with all these species.

The Operational Area lies within a foraging BIA for whale shark; however, given the offshore location, large numbers of species are not anticipated. It is, however, possible that individuals may transit through the Operational Area, therefore the potential exists for marine fauna interaction.

Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) indicates humpback whales are one of the most frequently reported whale species involved in vessel strikes worldwide (Laist *et al.*, 2001; Jensen & Silber, 2003). This observation is supported by Australian studies referenced in The Draft National Strategy for Mitigating Vessel Strike of Marine Mega-fauna (2018). Similarly, boat strike is recognised by the Approved Conservation Advice for *Rhincodon typus* (whale shark) as one of the threats to their recovery.

Given that cetaceans, marine turtles and other marine fauna exhibit avoidance behaviour, the likelihood of vessel collision with marine fauna is low. During movements into or out of the Operational Area, vessels will move slowly (5 knots or less), this also reduces the risk of collision allowing time for any marine fauna to move out of the immediate area. Management controls will also be implemented for further reduced the potential risk of collision.

### 8.3.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no vessel collision with protected marine fauna during the activity (whales, whale sharks and turtles) (EPO-12).

Control Measures relating to this risk include:

- regulations and measures for interacting with marine fauna (CM-6)
- marine fauna observations/reporting undertaken (CM-7).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.3.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate vessel use | Would eliminate risk. However, vessel movements cannot be eliminated as the vessels are required to undertake the activities. | × |
| Substitute | No substitute possible– the vessels will be contracted to meet the specification of the scheduled work | N/A. | N/A |
| Engineering | N/A | N/A. | N/A |
| Isolation | N/A | N/A. | N/A |
| Administrative | Regulations and measures for interacting with marine fauna | Vessels will comply with EPBC Regulations 2000 – Part 8 Division 8.1 (Interacting with cetaceans). Reduces risk of physical and behavioural impacts to marine fauna Minor cost in complying.<br>Is a legislated requirement. | ✓ |
| | The use of a dedicated marine fauna observer | Improves ability to spot and identify marine fauna at risk of collision. However, costs involved with implementing a dedicated marine fauna observer is grossly disproportional to the environmental benefit given low risk. | × |
| | Use of spotter planes to identify marine fauna in the region | Improves ability to spot and identify marine fauna at risk of collision. However, costs involved with implementing a dedicated marine fauna observer is grossly disproportional to the environmental benefit given low risk. | × |
| | Plan vessels movements during periods when sensitive marine fauna is not present | May reduce the risk from vessels during sensitive periods when more fauna may be present. However, limiting the vessel use to avoid sensitive periods would introduce other safety and environmental hazards (e.g. delay to field management/P&A activities, higher probability of inclement weather).<br>In addition, there is a low likelihood of encountering marine mammals in the Operational Area. | × |

### 8.3.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Vessels will comply with *EPBC Regulations 2000* – Part 8 Division 8.1 (Interacting with cetaceans) and the Australian National Guidelines for Whale and Dolphin Watching 2017 (DoEE 2017).<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to potential vessel collision with marine fauna. |
| Area Sensitivity/ Biodiversity | Pelagic marine megafauna including cetaceans and marine turtles at most risk. However, no turtle nesting beaches or feeding or breeding areas are located near the operational area and cetaceans and marine turtles exhibit avoidance behaviour.<br>The Operational Area is within a BIA for:<br>• pygmy blue whale –distribution<br>• humpback whale – migration<br>• flatback turtle – internesting buffer and suitable mating habitat<br>• whale shark – foraging including high density prey.<br>Vessel disturbance/strike is a threat within:<br>• Conservation Management Plan for the Southern Right Whale 2011-2021 (2012)<br>• Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (2015)<br>• Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (2015)<br>• Conservation Management Plan for the Blue Whale 2015-2025 (2015).<br>Turtle/vessel interactions/disturbance arising from increased vessel traffic is recognised as one of several key impacts to marine turtles in the Recovery Plan for Marine Turtles.<br>Control measures implemented will minimise the potential risks and impacts from the activity to relevant species identified in Recovery Plans and Conservation Advice. |
| ESD Principles | The EIA presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Additional controls were considered but they were not implemented as they are not considered ALARP:

- scheduling activities outside of the main humpback whale migration period (July to early October) or whale shark migratory and aggregation period (April to November)
- using a Marine Mammal Observer (MMO)
- not undertaking the activities and eliminating presence of support vessels

- reducing vessel speed.

The control measures proposed are consistent with applicable actions described in the relevant Recovery Plans and Approved Conservation Advice. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk ranking for vessel collision with marine fauna is low. This is acceptable in accordance with Eni's acceptability criteria (Table 6-3). Given the short duration of the Petroleum Activities Program, the low potential risk and the controls that will be implemented, Eni considers that the risks of vessel collision with marine fauna is acceptable and managed to ALARP.

## 8.4 Spill Risk Assessment Modelling Methodology

Spill modelling was undertaken by RPS APASA and GHD on behalf of Eni. The following spill scenarios were modelled:

| Modelling provider | Software | Scenario |
|---|---|---|
| RPS APASA | OILMAP and SIMAP | Subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days) |
| | | Vessel collision leading to release of 500 m³ marine diesel |
| GHD | SINTEF OSCAR | Subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days) |

Two different the modelling software systems were used, identified above. These are discussed below.

### RPS APASA – OILMAP and SIMAP

SIMAP and OILMAP modelling was used for the loss of well control and loss of marine diesel scenarios. Surface oil spill modelling was undertaken using a three-dimensional oil spill trajectory and weathering model, SIMAP, which is designed to simulate the transport, spreading and weathering of specific oil types under the influence of changing meteorological and oceanographic forces. Subsurface discharge modelling was undertaken using OILMAP, which predicts the droplet sizes that are generated by the turbulence of the discharge as well as the centreline velocity, buoyancy, width and trapping depth (if any) of the rising gas and oil plumes.

Modelling is 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 stochastic approach captures a wide range of potential weathering outcomes under varying environmental conditions, which is reflected in the aggregated spatial outcomes showing the areas that might be affected by sea surface and subsurface oil.

The modelling outcomes provide a conservative understanding of where a large-scale hydrocarbon release could travel in any condition, plotted all in one figure. The modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that would be implemented in response to the spill. Therefore, the modelling results represent the maximum extent that may be influenced by the released hydrocarbons.

**GHD – SINTEF OSCAR**

Modelling was carried out with SINTEF's Oil Spill Contingency and Response (OSCAR) system for a subsea release of Woollybutt crude during field management due to corrosion and valve failure scenario. An analogue hydrocarbon was chosen from SINTEF's Hydrocarbon library that provided a reasonable match to the Woollybutt assay, a comparison of properties can be seen in Table 8-1.

OSCAR provides an integrated transport and weathering model that accounts for hydrocarbon advection, dispersion, surface spreading, entrainment, dissolution, biodegradation, emulsification, volatilisation and shoreline interaction. The weathering model is supported by an extensive hydrocarbon library that contains detailed, laboratory-derived information for a wide range of hydrocarbons subjected to a wide range of environmental conditions.

OSCAR enables simulation of a hydrocarbon release scenario in deterministic mode (i.e. over a fixed period in time with results presented in a deterministic manner) or stochastic mode (i.e. the same scenario is simulated a number of times with varying start dates, and the results are presented in a probabilistic manner).

Twenty-three individual stochastic realisations were simulated, which is considered reasonable given the long release duration (365 days) and the large amount of overlap between consecutive modelling periods (each realisation overlaps with ~9 months of the following realisation). For each realisation, OSCAR separately tracks the components of oil stranded on shorelines, surface oil, and entrained droplets and dissolved oil in the water column, which is summed to provide a total water-accommodated fraction (WAF). Conservative thresholds were applied to each component (Section 8.4.2) and statistical spatial output is generated where each threshold was exceeded.

### 8.4.1 Representative Hydrocarbons

For the subsea release of Woollybutt crude due to loss of well control modelling, the Woollybutt crude assay report (Intertek, 2002) was provided to APASA and the modelling was undertaken using those parameters. Characteristics and weathering of Woollybutt crude are presented in Section 8.5.2.

For the GHD modelling, an analogue hydrocarbon was chosen from SINTEF's hydrocarbon library that provided a reasonable match to the Woollybutt crude assay (Intertek, 2002), a comparison of properties can be seen in Table 8-1. Kristin crude was selected as the most appropriate analogue for Woollybutt because:

- It is a low emulsifying crude oil, which is similar to the Woollybutt crude. Conversely,
- Kristin provides a reasonable match to the boiling point curve at lower temperatures (0-200 °C) and is more conservative (i.e. more persistent) at higher temperatures.

Given the likenesses in oil properties, it is expected that the Kristin crude would behave similarly to Woollybutt crude in water and is therefore considered an appropriate analogue used for leak scenario modelling.

**Table 8-1: Comparison of whole properties for Woollybutt crude and SINTEF's Kristin crude analogue**

| Parameter | Woollybutt crude | Kristin Crude |
|---|---|---|
| Oil type | Crude oil | Crude oil (low emulsifying) |
| API gravity | 48.6 | 46.6 |
| Specific gravity | 0.7857 | 0.794 |
| Viscosity @20C | 1.709 cSt | 2.0 cP |
| Pour point | -42C | -30C |
| Asphaltene content (% by weight) | 0.05% | 0.04% |

### 8.4.2 Zone of Potential Impact and Hydrocarbon Contact Thresholds

The outputs of the spill modelling are used as a tool to assess the environmental risk. It can provide an insight into the areas of the marine environment that could be exposed to hydrocarbon levels exceeding hydrocarbon threshold concentrations (presented in Table 8-2)

A conservative approach to adopting contact thresholds that are documented to impact the marine environment have been used to define the ZPI. To identify appropriate exposure values Eni have considered the advice provided by NOPSEMA Bulletin #1 Oil Spill Modelling (April 2019) and scientific literature. The selected hydrocarbon thresholds are presented in Table 8-2 and described further below.

**Table 8-2: Summary of environmental impact thresholds applied to the quantitative hydrocarbon spill risk modelling results**

| Spill scenario | Threshold applied to modelling |
|---|---|
| Subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days) | Shoreline Contact Hydrocarbon (10 g/m²)<br>Surface Hydrocarbon (1 g/m²)<br>Entrained hydrocarbon (100 ppb)<br>Dissolved aromatic hydrocarbon (6 ppb) |
| Subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days) | Shoreline Contact Hydrocarbon (10 g/m²)<br>Surface Hydrocarbons (1 g/m²)<br>Total WAF (70 ppb)<br>Dissolved WAF (6 ppb) |
| Vessel collision leading to release of 500 m³ marine diesel | Shoreline Contact Hydrocarbon (10 g/m²)<br>Surface Hydrocarbon (1 g/m²)<br>Entrained hydrocarbon (100 ppb)<br>Dissolved aromatic hydrocarbon (6 ppb) |

#### 8.4.2.1 Surface Hydrocarbon Threshold

Thresholds for registering biological impacts resulting from contact of surface slicks have been estimated by different researchers at approximately 10–25 g/m² (French

*et al*., 1999; Koops *et al*., 2004; NOAA, 1996). Potential impacts of surface slick concentrations in this threshold range may include harm to seabirds through ingestion from preening of contaminated feathers or the loss of the thermal protection of their feathers. A conservative surface hydrocarbon threshold of 1 g/m² was selected which is an order of magnitude below the minimum concentration that will result in harm to seabirds and other wildlife.

Surface hydrocarbons at a concentration of 1 g/m² have rainbow sheen in appearance, according to the Bonn Agreement Oil Appearance Code (Bonn Agreement, 2009) and are the lowest practical limit of observing oil in the marine environment (AMSA, 2012).

#### 8.4.2.2 Entrained Hydrocarbon/Total Water Accommodated Fraction Thresholds

Entrained hydrocarbons (also referred to as total Water Accommodated Fraction (WAF)) are insoluble oil droplets suspended in the water column. ). A wider range of LC50 values have been reported for species of crustacea and fish, ranging from 100 to 258,000,000 ppb (Gulec et al., 1997; Gulec and Holdway, 2000) The 100 ppb threshold is considered conservative in terms of potential for toxic effects leading to mortality for sensitive mature individuals and early life stages of species. This threshold has been defined to indicate a potential zone of acute exposure, which is more meaningful over shorter exposure durations. Contact within this exposure zone may result in impacts to the marine environment, such as sub-lethal impacts to most species and lethal impacts to sensitive species.

OSPAR has published a predicted no effect concentration (PNEC) for produced formation water (PFW), which accounts for the dispersed oil fractions, which is representative of the WAF. The OSPAR PNEC is 70 ppb (median estimate (50% confidence) at 5% of the hazardous concentration and is based on biomarker and whole organism testing to total hydrocarbons by Smit *et al.* (2009). This PNEC represents an acceptable long term chronic exposure level from continuous point source discharges in the North Sea, which is one of the most concentrated areas in the world for oil and gas production.

#### 8.4.2.3 Dissolved Aromatic/Dissolved Water Accommodated Fraction Thresholds

The 6 ppb threshold value for species toxicity in the water column is based on global data from French *et al*. (1999) and French-McCay (2002, 2003), which showed that species sensitivity (fish and invertebrates) to dissolved aromatics exposure > 4 days (96-hour LC50) under different environmental conditions varied from 6 ppb-400 ppb, with an average of 50 ppb. This range covered 95% of aquatic organisms tested, which included species during sensitive life stages (eggs and larvae).

Based on scientific literature, a minimum threshold of 6 ppb is used to define the low exposure zones (Engelhardt, 1983; Clark, 1984; Geraci & St. Aubin, 1988; Jenssen, 1994; Tsvetnenko, 1998). This exposure zone is not considered to be of significant biological impact, however in the absence of any toxicology results for Woollybutt crude, the 6 ppb threshold has been applied as a conservative measure. This exposure zone represents the area contacted by the spill and conservatively defines the outer boundary of the area of influence from a hydrocarbon spill.

#### 8.4.2.4 Shoreline Contact Threshold Concentrations

French-McCay (2009) defines accumulated hydrocarbons ≥ 100 g/m² to be the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat. As a conservative measure a threshold of 10 g/m² has been applied to represent shoreline impact and represents a low contact value for interpreting shoreline accumulation modelling results (French-McCay, 2005, 2006).

A shoreline concentration of 100 g/m$^2$, or above, is likely to be representative of the minimum limit that the oil can be effectively cleaned according (AMSA, 2015; NOPSEMA, 2019) and is therefore used as a guide for shoreline clean-up planning.

## 8.5 Subsea Release of Crude –Plug & Abandonment Activities (Risk ID 12)

### 8.5.1 Summary of Environmental Impact

| Hazard | Subsea release of crude (P&A Activities) | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | C | 4 | H |
| Residual Risk | A | 4 | M |

### 8.5.2 Description of Hazard

All four suspended shut-in wells were producing with assistance of gas lift. Of these four suspended shut-in wells, WB4 is the only well currently capable of flowing naturally. The other three wells can produce limited gas/oil/water (due to the presence of small gas cap in the well) and will be then naturally killed by the hydrostatic of the water produced from the reservoir.

During P&A operations, changes of pressure (kicks) can occur in which reservoir fluids can flow into the well bore. This will happen if the pressure in the reservoir is greater than the hydrostatic pressure of the fluid acting on the well bore.

P&A will require entry of the well via drilling. The severity of the kick will depend on the porosity and permeability of the formation, the relative difference between the formation pressure (pore pressure) and drilling fluid pressure, as well as the response time of the drilling personnel on the drilling facility to identify a kick has occurred.

The P&A program is designed to prevent kicks by maintaining a hydrostatic overbalance to the known reservoir pressure. During P&A operations, the well is constantly monitored to ensure that the fluid hydrostatic pressure is greater than the reservoir pressure.

Warning signs that indicate that a kick might be taking place include:

- an increase in drilling fluid return flow rate
- tripping of a drill string not taking the correct fluid displacement
- the presence of gas bubbles in the returned drilling fluid.

If one or more of these signs are observed, flow from the well will be checked and if flow is confirmed, it will be shut in using the IV/MODU, WCE or a Subsea Test Tree. The well can then be brought under control by bullheading an appropriate volume of fluid into the reservoir and adjusting the density (weight) of the drilling fluid.

While highly unlikely, kicks may still occur due to human error, such as missing warning signs or using an inappropriate volume of drilling fluid. When uncontrolled, a kick could result in a loss of well control.

No surface release is credible from WB4 during the P&A (which will plug this well and remove the well integrity risk). P&A operations with an IV will be riserless and there will be no conduit for the well to flow to surface. P&A operations with a MODU will be conducted with a marine riser on a subsurface BOP attached to the subsea tree,

through which a landing string will be run and connected to the subsea trees tubing hanger. The landing string will contain multiple mechanical shut-off devices and a surface flow tree. This will be in place before the well is re-entered.

#### 8.5.2.1 Industry Experience

A risk assessment by AMSA of oil spills in Australian ports and waters (Det Norske Veritas, 2011) concluded that:

- Overall national exceedance frequency for oil spills from offshore drilling in Australia is 0.033 for spills > 1 tonne/year decreasing to 0.008 for spills > 100 tonnes/year (Det Norske Veritas, 2011).
- Blow-out probability for an exploration well was estimated to be 3.1 × 10-4 per well (Det Norske Veritas, 2011). This is based on data from the Gulf of Mexico, United Kingdom and Norway from 1980–2004, including wells that had blow out preventers installed.
- Probability of a blow-out from an oil exploration well is 2.5 × 10-4 (0.00025, or 0.025%) (International Association of Oil and Gas Producers, 2010).

Therefore, a loss of well control is considered highly unlikely.

Eni has a good history of implementing industry standard practice in well design. There have not been any incidents resulting in offshore loss of well control events in Australia that have resulted in significant releases or significant environmental impacts. Given this and the above industry experience a well blowout is a 'rare' event under the Eni Risk Assessment Matrix (Figure 6-1).

#### 8.5.2.2 Blowout Duration

The 74-day blowout duration has been determined as a worst case duration and is based on the maximum depth of the hydrocarbon reservoir being open and the estimated time to drill a relief well under the Mutual Aid Memorandum of Understanding (MoU). 74 days relief well drilling is based on the details within Table 8-3.

**Table 8-3: Woollybutt relief well drill times**

| Phase | Justification | Duration (days) |
|---|---|---|
| Mobilisation | Time to secure the well and mobilisation duration. Access to a MODU to drill the relief well would be via the APPEA MoU for mutual aid | 35 |
| Drill relief well | Based on Eni, production well design | 25 |
| Intersect and kill | Based on Eni, production well design | 7 |
| Plug and abandon | Based on Eni, production well design | 7 |
| Total days | | 74 |

Blowout Volume

A loss of well control during P&A activities would result in a subsea release of Woollybutt crude. The worst-case scenario would result in the landing string snapping on the WB4 well and failure of the BOP and crude being released through a 6.2 inch orifice at a rate of 900 bbl/day (143.1 m³/day) over 74 days, with a total volume of 66,600 bbl (10,589 m³).

#### 8.5.2.3 Woollybutt Crude Characteristics and Weathering

The physical and chemical properties of Woollybutt crude used for the oil spill modelling presented below were determined from the Woollybutt crude assay report (Intertek, 2002).

Table 8-4 and Table 8-5 show the physical characteristics and boiling point ranges for Woollybutt crude, respectively. The hydrocarbon property category and hydrocarbon persistence classification were derived from AMSA (AMSA, 2015a) guidelines. The classification is based on a hydrocarbon's specific gravity in combination with relevant boiling point ranges.

**Table 8-4: Physical properties of Woollybutt crude (Intertek, 2002)**

| Physical Properties | Woollybutt crude |
|---|---|
| Density (kg/m³) | 785.0 (at 15 °C) |
| API | 48.6 |
| Dynamic viscosity (cP) | 1.342 (at 25 °C) |
| Pour point (°C) | -42.0 |
| Hydrocarbon property category | Group I |
| Hydrocarbon persistence classification | Non-persistent |

**Table 8-5: Boiling-point breakdown of Woollybutt crude (Intertek, 2002)**

| Oil Type | Volatiles (%) | Semi-Volatiles (%) | Low Volatiles (%) | Residual (%) | Aromatics (%) |
|---|---|---|---|---|---|
| Boiling point (°C) | < 180 C4 to C10 | 180-265 C11 to C15 | 265-380 C16 to C20 | > 380 > C20 | Of whole oil < 380 BP |
| | Non-persistent | | | Persistent | |
| Woollybutt crude | 43.4 | 25.4 | 24.7 | 6.5 | 2.9 |

Woollybutt crude contains a relatively low proportion of hydrocarbon compounds (6.5% by mass) that will not evaporate at atmospheric temperatures. These compounds will persist in the marine environment.

The mixture is composed of hydrocarbons that have a wide range of boiling points and volatilities at atmospheric temperatures, and which will begin to evaporate at different rates on exposure to the atmosphere. Evaporation rates will increase with temperature, but in general about 43.4% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); a further 25.4% should evaporate within the first

24 hours (180 °C < BP < 265 °C); and a further 24.7% should evaporate over several days (265 °C < BP < 380 °C).

A series of model weather tests were conducted to illustrate the potential behaviour of Woollybutt crude when exposed to idealised and representative environmental conditions:

Instantaneous release (1-hour discharge) at a discharge rate of 50 m³/hr under calm wind conditions (constant 5 knots), assuming low seasonal water temperature (27 °C) and average air temperature (25 °C). Slick also subject to ambient tidal and drift currents.

Instantaneous release (1-hour discharge) at a discharge rate of 50 m³/hr under variable wind conditions (4-19 knots, drawn from representative data files), assuming low seasonal water temperature (27 °C) and average air temperature (25 °C). Slick also subject to ambient tidal and drift currents.

The results for the variable-wind case (Figure 8-1) indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (<1% after 24 hours). This is largely due to the higher wind speeds within this test case generating significant entrainment events, with almost all of the non-evaporated floating oil mass becoming entrained within hours of release commencement. The higher proportion of entrained oil predicted in the variable-wind case also results in a larger proportion of the oil dissolving: ~21% after 24 hours compared with <1% under calm conditions.

The evaporation rate observed in the first 24 hours is similar in both weathering tests, however, as the wind speed increases in the variable-wind case, increased entrainment reduces the proportion of oil available for evaporation, resulting in around 63% of the spill volume expected to evaporate after 7 days as compared to around 86% in the constant-wind case.

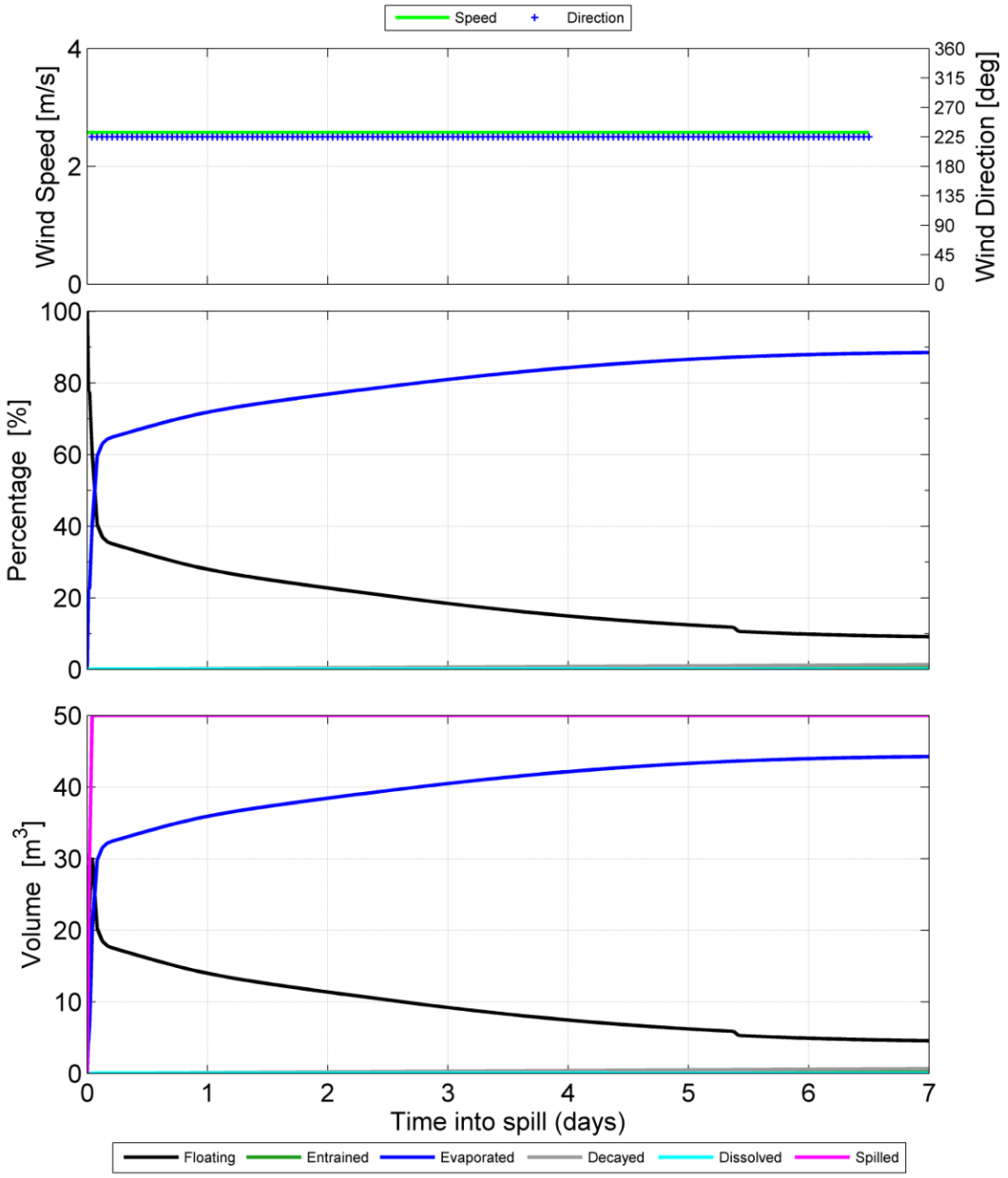



**Figure 8-1: Mass balance plot representing, as proportion (middle panel) and volume (bottom panel), the weathering of Woollybutt crude spilled onto the water surface as a one-off release (50 m³ over 1 hour) and subject to a constant 5 km (2.6 m/s) wind at 27 °C water temperature and 25 °C air temperature (APASA, 2019)**

### 8.5.3 Oil Spill Modelling

A 10,589 m³ Woollybutt crude release was modelled by RPS APASA (2019) at the WB4 well for summer, winter and transitional seasons and is considered appropriate, although conservative, for informing the approximate spatial extent of potential impacts from a well blowout event during P&A activities.

Table 8-6 presents the parameters and justification used in the modelling.

**Table 8-6: Summary of parameter and justifications for well blowout spill modelling from the WB4 location**

| Parameter | Description |
|---|---|
| Number of spill simulations | A total of 150 replicate simulations were run over an annual period (50 per season) |
| Hydrocarbon type | Woollybutt crude |
| Release type | Well blowout (subsea) |
| Total spill volume | 10,589 m³ over 74 days, assuming constant flow |
| Spill volume justification | Open hole flowrate |
| Release depth | Subsea |
| Release depth justification | Only credible spill scenario is from subsea as work is undertaken riserless with no conduit for hydrocarbons to reach the surface during P&A |
| Release duration | 74 days |
| Release duration justification | See Section 8.5.2.2 |

#### 8.5.3.1 Surface and Shoreline Hydrocarbons

The predicted seasonal probability contour figures (Figure 8-2 to Figure 8-4) indicate that surface and shoreline oil concentrations at or greater than 1 g/m² could travel up to 54 km from the WB4 well (in the winter season). The maximum extent at a concentration of 10 g/m² is 2 km (in winter). Concentrations are not set to exceed 25 g/m².

Sensitive receptors are not predicted to be contacted by surface oil at or greater than the 1 g/m² threshold in any season.

The potential for accumulation of oil on shorelines is predicted to be low across all seasons, with a worst case local accumulated volume of 1 m³, forecast for the Ningaloo Coast receptor.

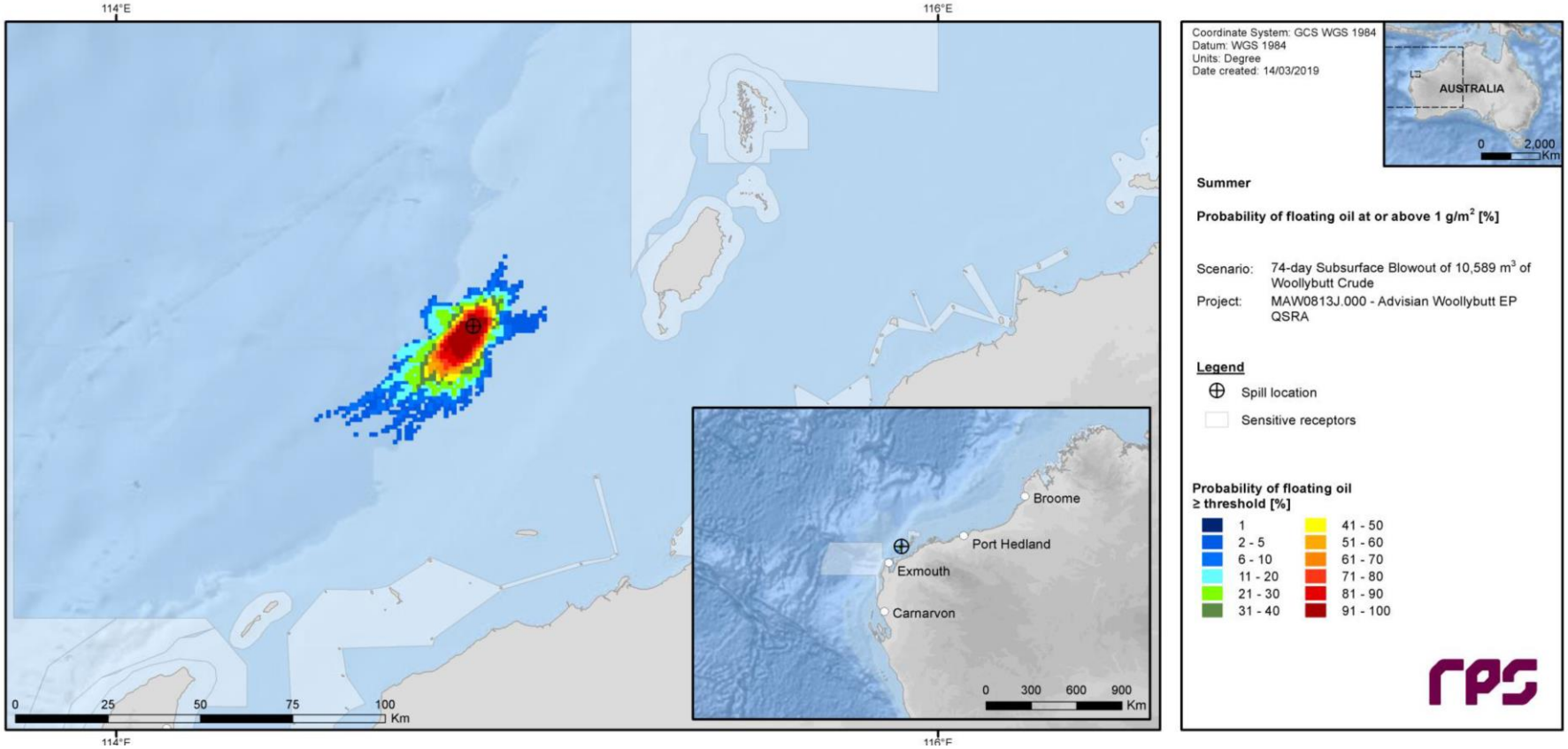



**Figure 8-2: Predicted probability of surface hydrocarbon concentrations at or above 1 g/m² resulting from a 74-day subsea release of Woollybutt crude at the WB4 well during summer (APASA, 2019)**

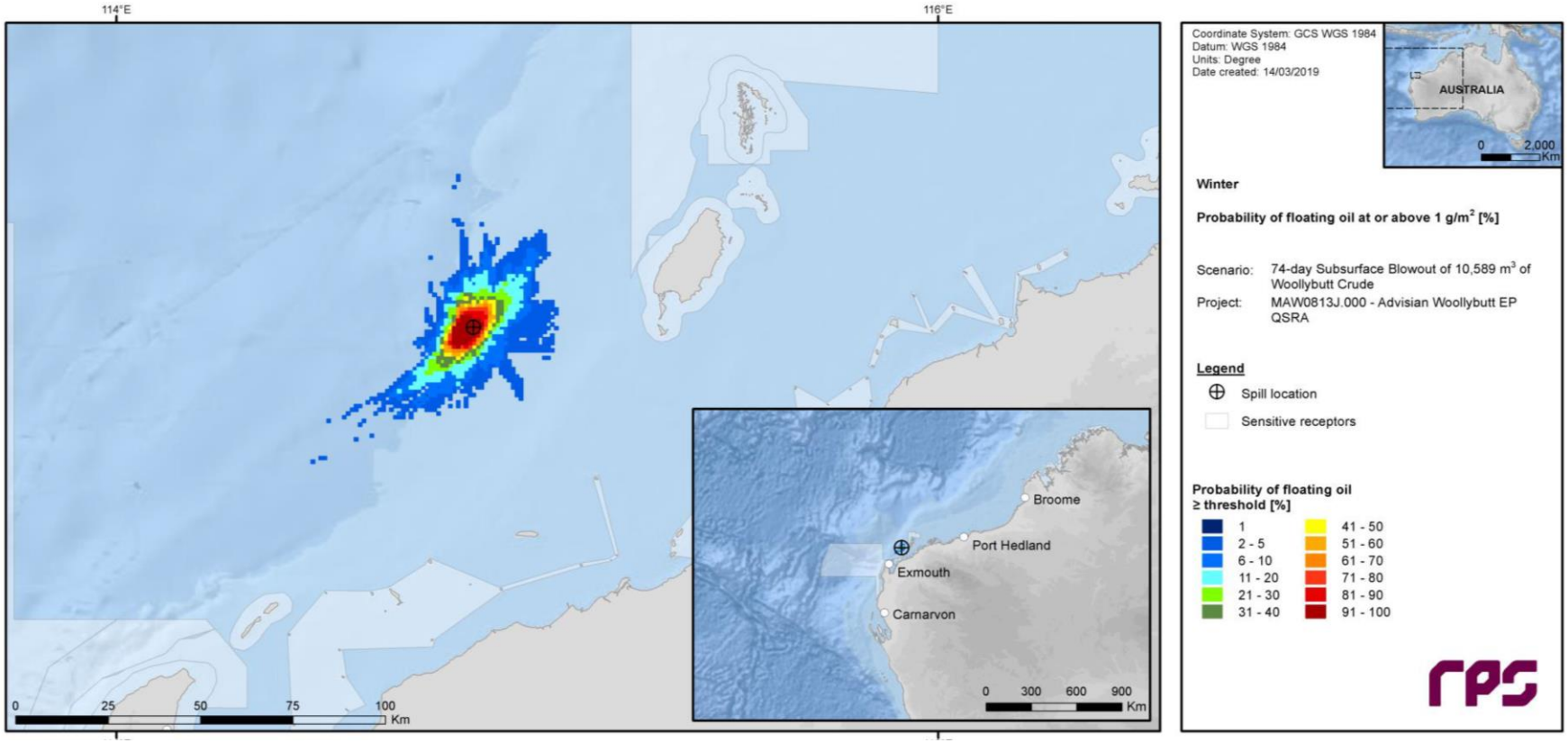



**Figure 8-3: Predicted probability of surface hydrocarbons concentrations at or above 1 g/m² resulting from a 74-day subsea release of Woollybutt crude at the WB4 well during winter (APASA, 2019)**

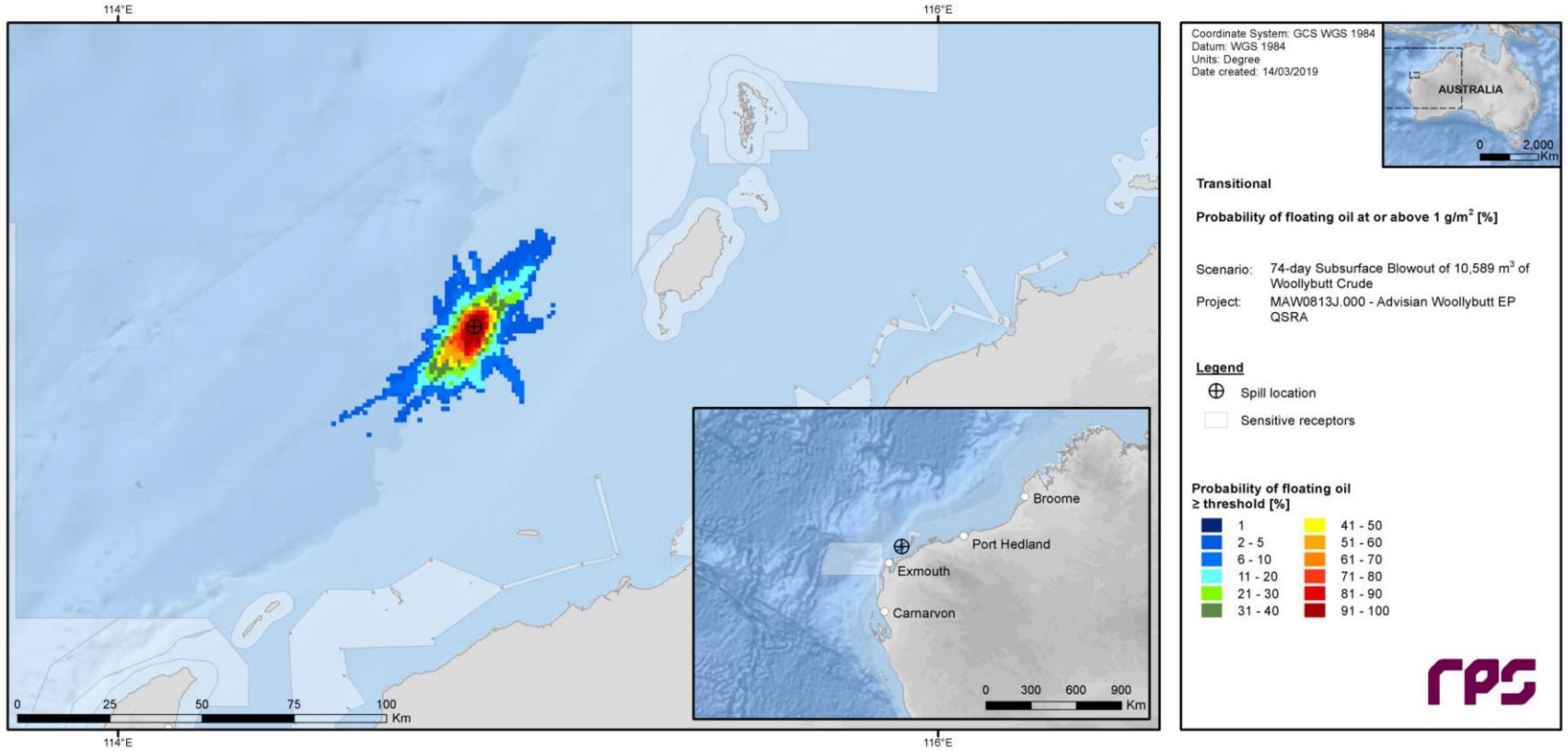



**Figure 8-4: Predicted probability of surface hydrocarbons concentrations at or above 1 g/m² resulting from a 74-day subsea release of Woollybutt crude at the WB4 well during transitional months (APASA, 2019)**

#### 8.5.3.2 Subsurface – Entrained Hydrocarbons

The seasonal probability contour figures (Figure 8-5 to Figure 8-7) indicate entrained oil concentrations at or greater than 100 ppb could travel up to 251 km from the WB4 well location in summer.

Probability of contact by entrained oil concentrations are predicted to be greatest in summer at Ningaloo AMP (30%) at the 100 ppb threshold (Table 8-7).

**Table 8-7: Expected entrained oil outcomes at sensitive receptors resulting from a 74-day surface release of Woollybutt crude at the WB4 well location (APASA, 2019)**

| Receptor | Probability (%) of entrained hydrocarbon concentration contact at ≥ 100 ppb | | | Minimum time to receptor waters (hours) at ≥ 100 ppb | | | Maximum entrained hydrocarbon concentration (ppb), at any depth in worst case replicate | | |
|---|---|---|---|---|---|---|---|---|---|
| | Summer | Winter | Transitional | Summer | Winter | Transitional | Summer | Winter | Transitional |
| Ningaloo MP | 18 | 16 | 8 | 379 | 299 | 1,113 | 184 | 223 | 236 |
| Murion Islands | - | 22 | 14 | - | 362 | 1,646 | - | 454 | 146 |
| Ningaloo Coast | 4 | 10 | 8 | 512 | 299 | 1,119 | 147 | 193 | 236 |
| Montebello AMP | 4 | 4 | 10 | 1,803 | 186 | 235 | 156 | 168 | 168 |
| Ningaloo AMP | 30 | 16 | 14 | 181 | 581 | 1,103 | 204 | 242 | 138 |
| Gascoyne AMP | 18 | 6 | 16 | 357 | 296 | 120 | 175 | 203 | 125 |

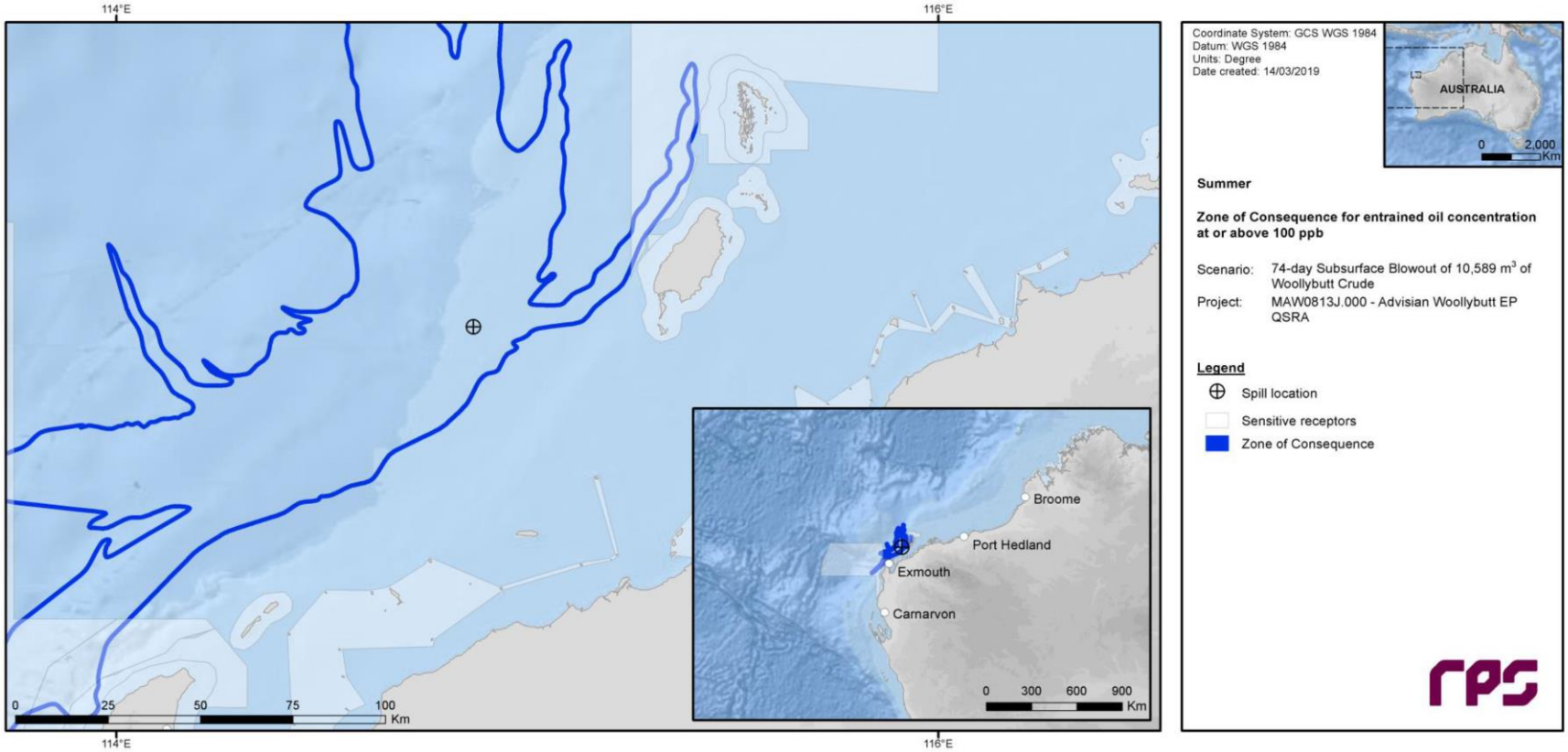



**Figure 8-5: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from a 74-day subsea release of Woollybutt crude at the WB4 well during summer (APASA, 2019)**

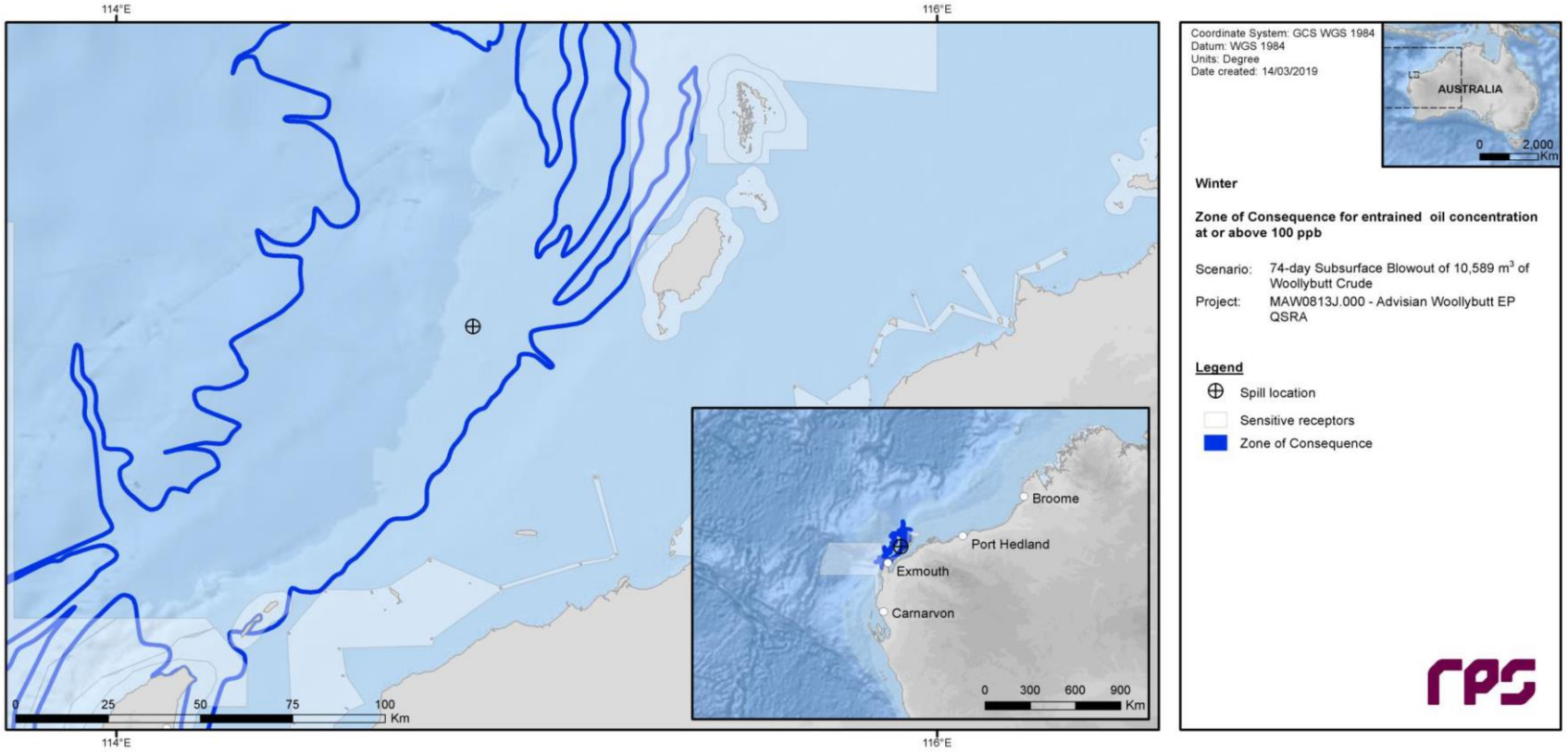



**Figure 8-6: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from a 74-day subsea release of Woollybutt crude at the WB4 well during winter (APASA, 2019)**

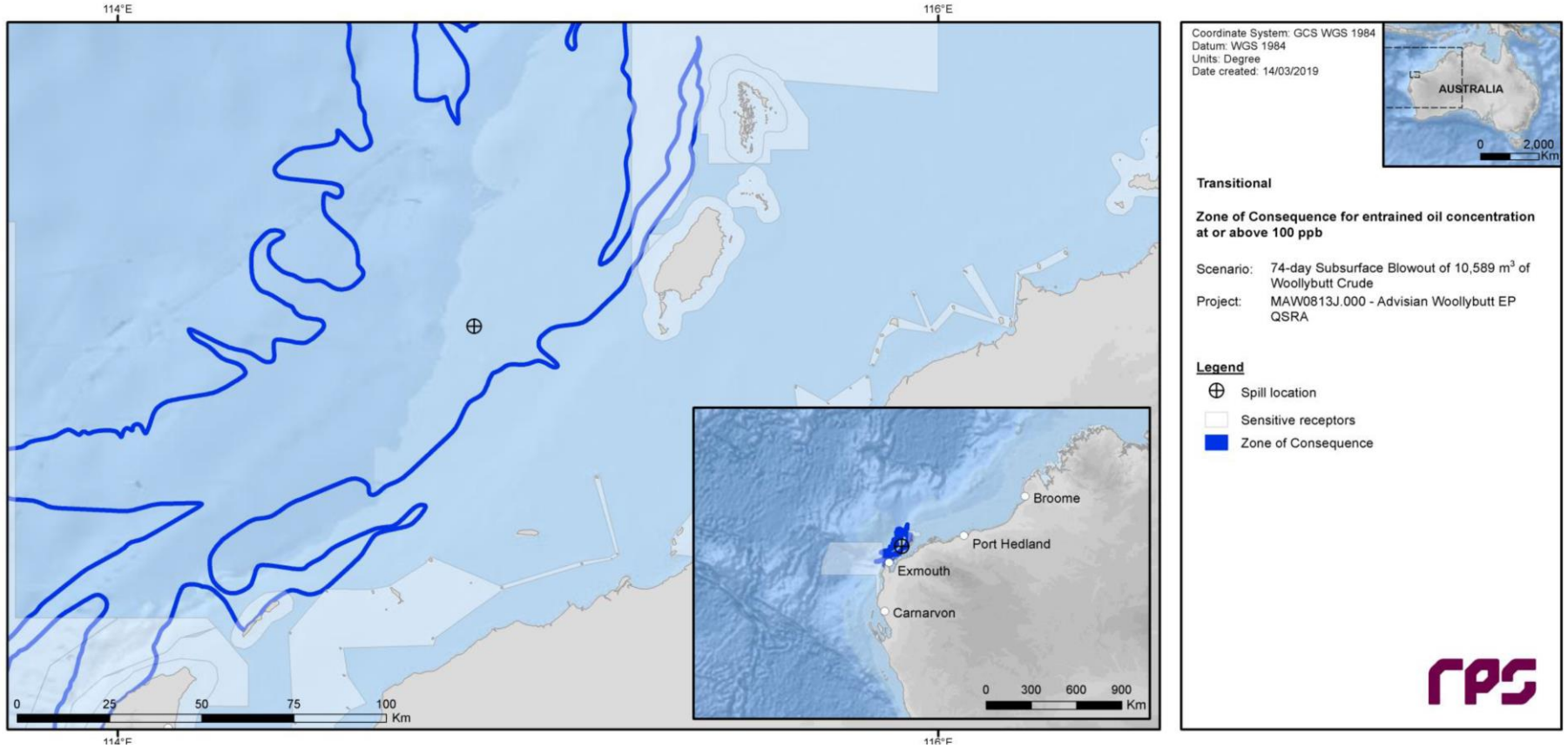



**Figure 8-7: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from a 74-day subsea release of Woollybutt crude at the WB4 well during transitional months (APASA, 2019)**

#### 8.5.3.3 Subsurface – Dissolved Aromatics

The seasonal probability contour figures (Figure 8-8 to Figure 8-10) indicate that dissolved aromatic hydrocarbon concentrations at or greater than 6 ppb) could travel up to 136 km from the WB4 location in summer with concentrations not set to exceed the 50 ppb and high 400 ppb thresholds.

The probabilities of contact by dissolved aromatic hydrocarbon concentrations are not predicted to exceed > 2% at any receptor in any season. The worst-case instantaneous dissolved aromatic hydrocarbon concentration at any receptor is predicted at Ningaloo State Marine Park in winter at 10 ppb.

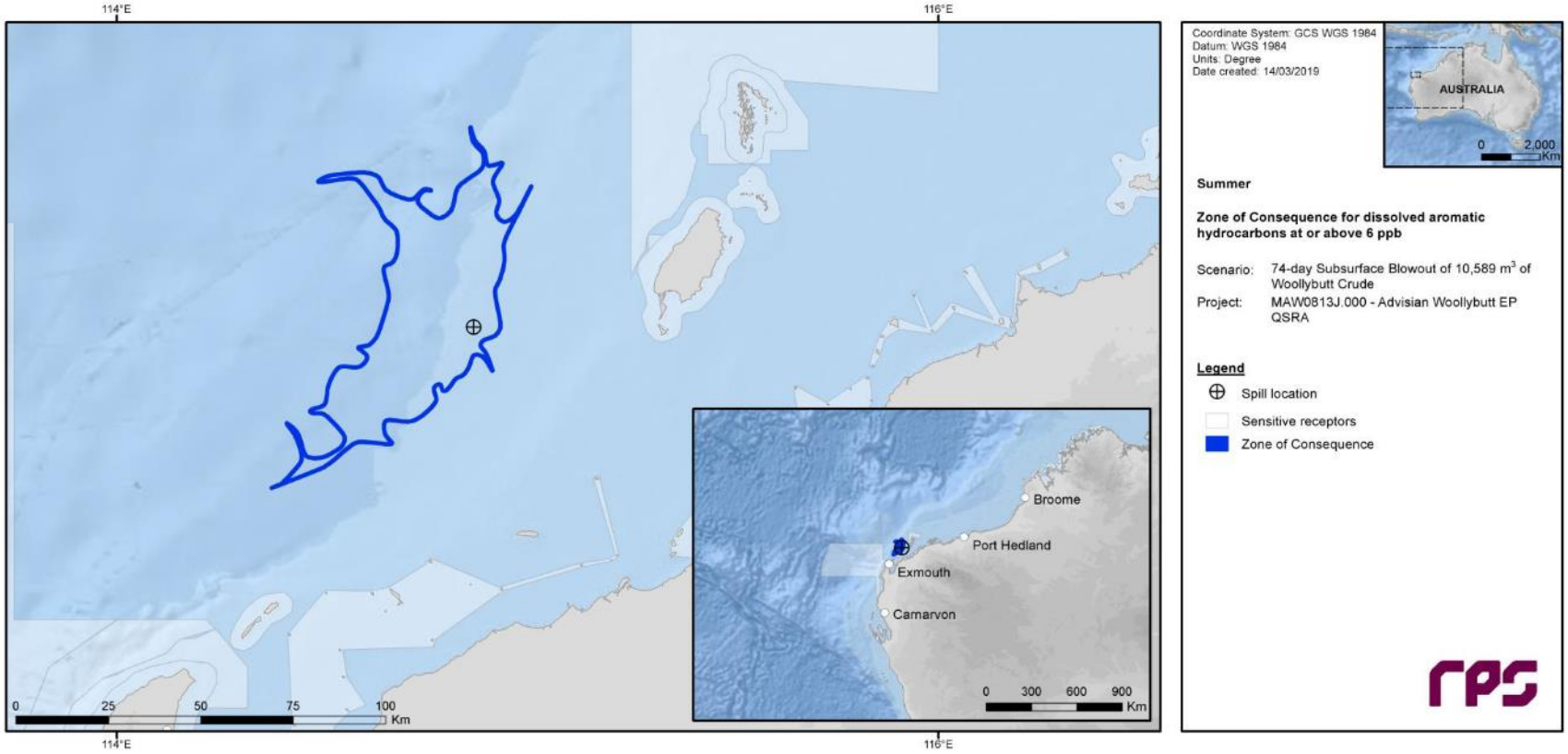



**Figure 8-8: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from a 74-day surface release of Woollybutt crude at the WB4 well during summer (APASA, 2019)**

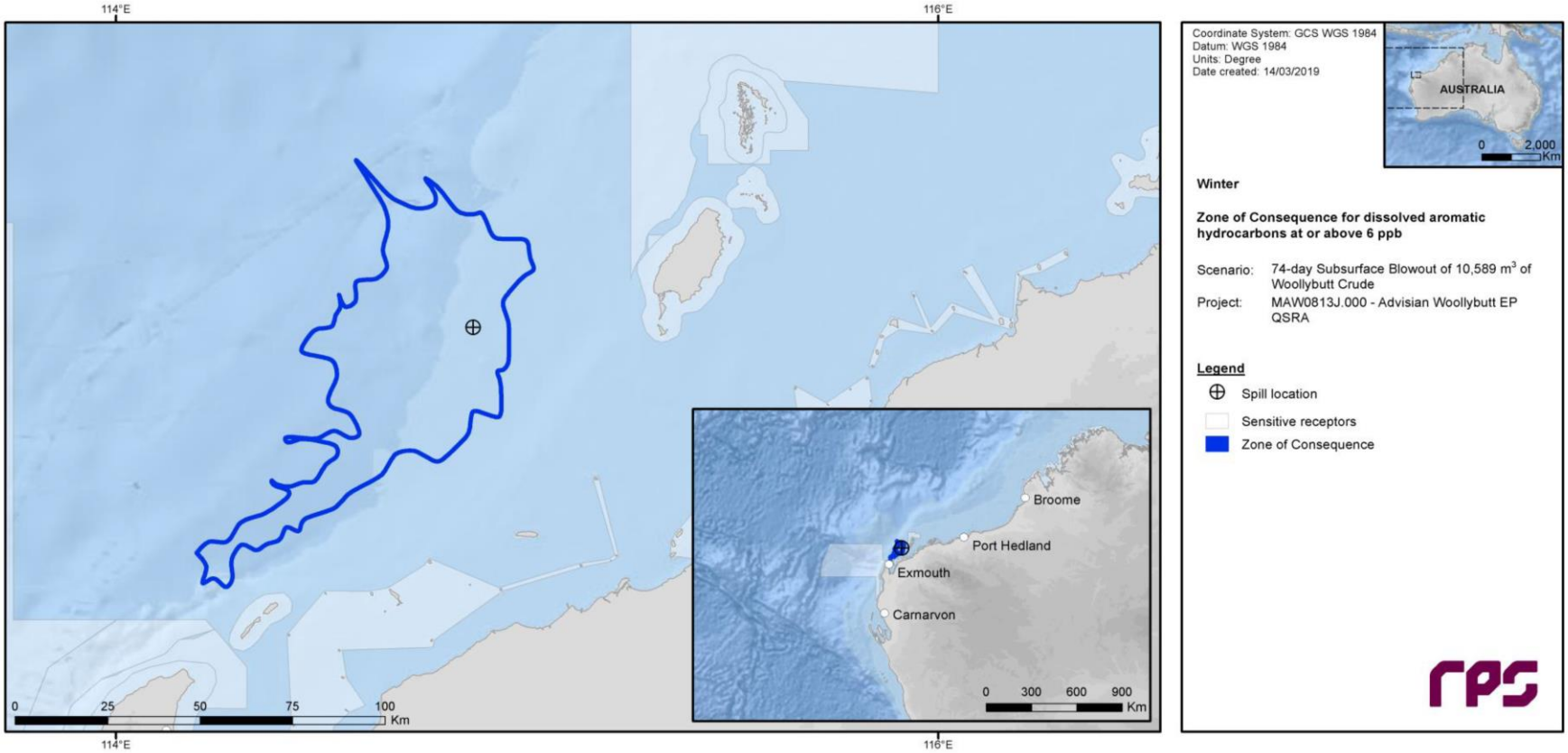



**Figure 8-9: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from a 74-day surface release of Woollybutt crude at the WB4 well during winter (APASA, 2019)**

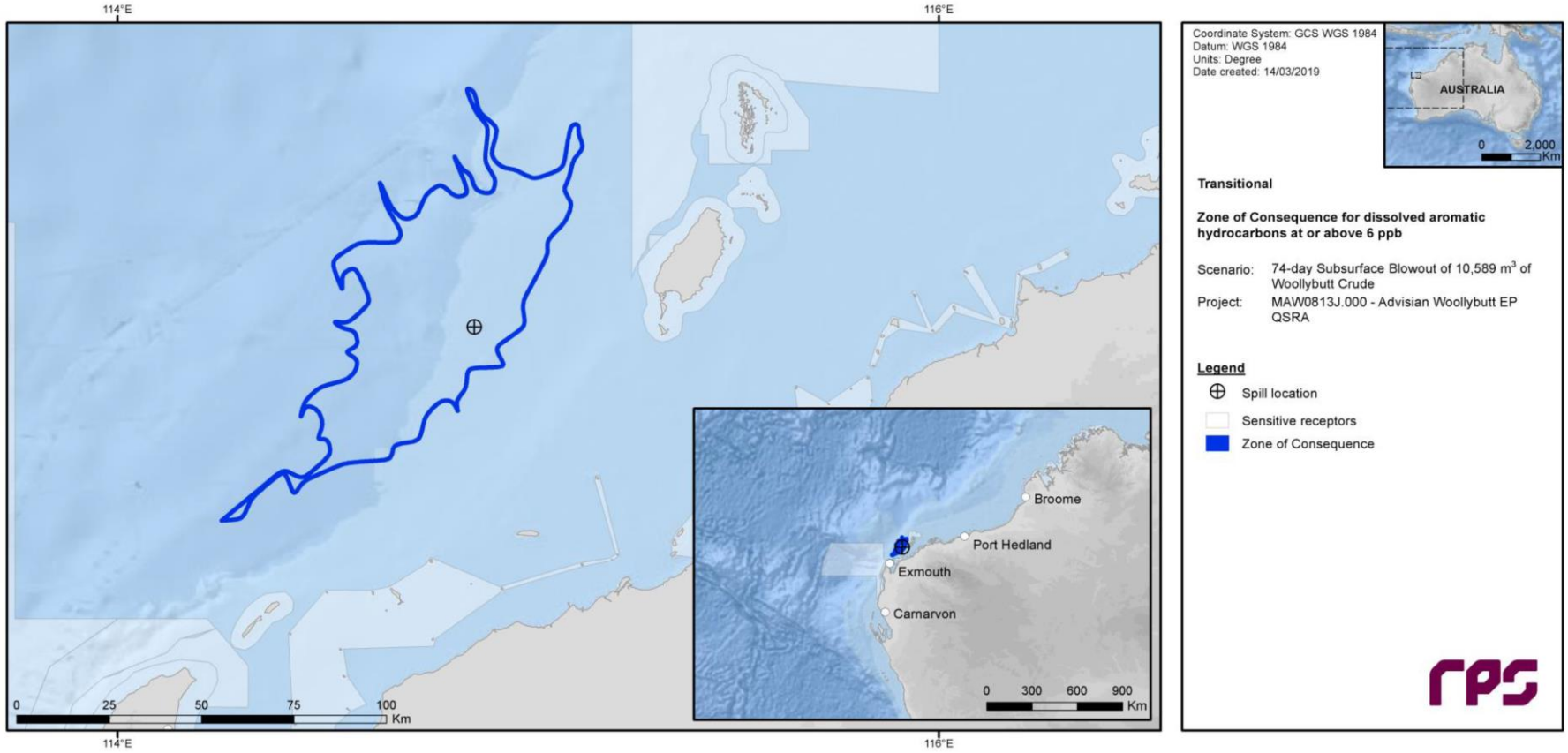



**Figure 8-10: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from a 74-day surface release of Woollybutt crude at the WB4 well during transitional months (APASA, 2019)**

### 8.5.4 Potential Environmental Impact

A loss of 10,589 m³ Woollybutt crude to the marine environment would result in a localised reduction in water quality on the sea surface. As described above, the maximum distance a surface spill could travel at 1 g/m² is predicted to be 54 km. The potential for accumulation of oil on shorelines is predicted to be low across all seasons, with a worst-case local accumulated concentration and volume of 4.7 g/m² and > 1 m³, respectively, forecast for Ningaloo State Marine Park. Entrained hydrocarbon concentrations at or greater than 100 ppb could travel up to 251 km from the release location, which forms the extent of the ZPI for this well blowout event.

The Montebello, Ningaloo and Gascoyne AMP's have the potential to receive concentrations of entrained (at 100 ppb) hydrocarbons (See Table 8-7). Potential impacts may include: the contamination of sediments, impacts to benthic fauna/habitats and associated impacts to demersal fish populations and reduced biodiversity. However, given the low maximum concentrations reaching the AMPs it is not anticipated that the values detailed in Section 4.5 will be compromised.

The potential impacts of surface, shoreline, entrained and dissolved hydrocarbons on sensitive receptors occurring in the ZPI, and along the stretch of coastline where shoreline accumulation of hydrocarbons above 10 g/m² could occur from a Woollybutt crude leak event (refer Section 8.6), is provided in Table 8-8).

**Table 8-8: Potential impacts of hydrocarbons on sensitive receptors**

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| **Marine fauna** | | | |
| Plankton (including zooplankton; fish and coral larvae) | Surface hydrocarbons will have no impact on plankton as plankton is present in the water column only. | There is potential for localised mortality of plankton due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest. | N/A |
| | As fish and sharks dwell in the water column, impacts are most likely from the entrained hydrocarbons, through the pathways of ingestion or the coating of gill structures. This could lead to respiratory problems or accumulation of hydrocarbons in tissues. In the worst instance this could lead to mortality, or sub-lethal stress.<br>Site-attached fish, such as reef fish, have small home ranges and are at higher risk from hydrocarbon exposure than more wide-ranging species. The exact impact on resident fish populations at impacted shoals or reefs will be dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities.<br>The larval stage of fish is more likely to be susceptible; however, in comparison to predation and natural loss, any impacts would be over a small proportion of the marine environment in which they may occur and any measurable impact at the population level is considered to be low. The Operational Area is not anticipated to provide spawning grounds for fish species, given their preference for spawning in oceanic conditions on reef edges and area. | | N/A |
| Marine mammals | Marine mammals may be come in contact with hydrocarbons through surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces. Fresh hydrocarbons may have a higher potential to cause toxic effects when ingested, while weathered hydrocarbons are considered to be less likely to result in toxic effects.<br>Modelling in the blowout scenario indicates that the maximum distance to the outer extent of the 1 g/m² surface hydrocarbons is predicted to be 54 km. For the | Marine mammal that physically come in contact with surface, entrained or dissolved aromatic hydrocarbons may suffer surface fouling, ingestion of hydrocarbons (from prey, water and sediments), aspiration of oily water or droplets and inhalation of toxic vapours (Deepwater Horizon Natural Resource Damage Assessment Trustees 2016). Effects such as irritation of eyes/mouth and potential illness may also occur. | N/A |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | leak scenario the outer extent at 1 g/m² is predicated to be 110 km. Surface hydrocarbons concentrations are not predicted to exceed 25 g/m² concentrations. It is therefore predicted the impact area from surface hydrocarbons is confined to around the spill site and not the wider region. In addition the weathering results for the variable-wind case for crude (Figure 8-1) indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (< 1% after 24 hours). Woollybutt crude also contains a relatively low proportion (6.5% by mass) of hydrocarbon compounds that will not evaporate at atmospheric temperatures.<br>Behavioural disturbance (i.e. avoiding spilled hydrocarbons) in some instances has been observed (Geraci, 1988) or several species of cetacean suggesting that cetaceans have the ability to detect and avoid surface slicks. Observations during spills have noted larger whales (both mysticetes and odontocetes) and smaller delphinids traveling through and feeding in oil slicks (Aichinger Dias *et al*., 2017).<br>The highest potential risks for dugongs are related to direct ingestion of seagrass or macro-algae exposed to acute or chronic toxicity and or drastic reduction on seagrass coverage due to hydrocarbon spills (Heinsohn *et al.,* 1977). | Whales and dolphins could potentially ingest dissolved oil when feeding in open water. Ingestion of oil at the quantities required to induce direct toxic effects is considered unlikely in a spill scenario (Geraci, 1998). | |
| | Twelve migratory marine mammal species were identified by the EPBC Protected Matters search (Section 4.3) for the ZPI. Of these, three are listed as threatened and one as vulnerable.<br>Sei whale: In the unlikely event of a hydrocarbons spill, transient individuals may encounter entrained and surface hydrocarbons. However, the absence of any known feeding, resting or breeding areas means significant numbers are unlikely to be impacted. There is currently no BIA for the sei whale (DoEE, 2016b)<br>Blue whales: Blue whales show preference for water depths > 500 m, and a small number of individuals may encounter entrained or surface hydrocarbons from a release. It is believed Antarctic blue whales do not generally migrate further north than subtropical waters and are therefore unlikely to occur in ZPI (Commonwealth of Australia, 2015). The BIA for pygmy blue whales, however, shows that the | | N/A |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | Operational Area lies within their distribution range and the ZPI intersects their distribution, foraging and migration range. Significant numbers are unlikely to be impacted.<br>Fin whale: In the unlikely event of a hydrocarbon spill, transient individuals may encounter entrained and surface hydrocarbons. There is currently no BIA for fin whales (DoEE, 2016b). Based upon the low numbers of sightings in the ZPI and Operational Area, it is unlikely that significant populations of fin whale would be present at any time. Significant numbers are unlikely to be impacted.<br>Southern Right Whale: The nearest BIA for the southern right whale is 900 km from the Operational Area and ZPI, suggesting it is highly unlikely that the ZPI provides key habitat for biological processes associated with this species.<br>Humpback whale: The Operational Area and ZPI lie within the BIA for humpback whale migratory range. The migration path usually stays within 50 km offshore south of Shark Bay and extends to up to 100 km offshore in the Kimberley region (DoEE, 2017). The southward migration path is typically closer to the coastline. Considering the steadily-increasing humpback whale population size in WA, it is possible that this species may come into contact with entrained and dissolved hydrocarbons during the migration period, however, is unlikely to come in contact with surface hydrocarbons which are more centred around the spill location.<br>Given the Woollybutt crude and diesel is expected to evaporate and weather rapidly when released to the environment, relatively fresh entrained, dissolved and surface hydrocarbons (closer to the release location) are considered to have the greatest potential for impact. | | |
| Marine reptiles | Risk of direct contact with hydrocarbons is due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Irritation of mucous membranes in the nose, throat and eyes leading has been observed to cause inflammation and infection (National Oceanic and Atmospheric Administration, 2010).<br>Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces and may also impact turtles if they inhale toxic vapours. This can lead to lung damage and congestion, interstitial emphysema, inhalant pneumonia and neurological impairment (National Oceanic and Atmospheric Administration, 2010). | Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness. Irritation of mucous membranes in the nose, throat and eyes leading has been observed to cause inflammation and infection (National Oceanic and Atmospheric Administration, 2010). | Shoreline contact and beached hydrocarbons may result in toxic impacts to turtle nesting habitat potentially impacting adults, eggs and hatchlings.<br>Important turtle nesting sites within the ZPI include the Ningaloo coast, Montebello/Barrow/Lowendal Islands and the Ningaloo Coast. In the unlikely event that hydrocarbons did accumulate at a turtle nesting area, there is potential for adult turtles and/or |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | Adult sea turtles exhibit no avoidance behaviour when they encounter hydrocarbon spills (National Oceanic and Atmospheric Administration, 2010).<br>Surface hydrocarbons concentrations are not predicted to exceed 25 g/m² concentrations outside the immediate vicinity of the hydrocarbon releases. It is therefore predicted the impact area from surface hydrocarbons is confined to around the spill site and not the wider region. In addition the weathering results for the variable-wind case (Figure 8-1) indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (<1% after 24 hours). Woollybutt crude also contains a relatively low proportion (6.5% by mass) of hydrocarbon compounds that will not evaporate at atmospheric temperatures.<br>Therefore, impacts from surface oil are considered localised and temporary. | | hatchlings to be impacted. Potential impacts include smothering of adults and hatchling and/ or avoidance behaviour of adult turtles. This could result in failed or aborted nesting attempts or a reduction in survival rates of hatchlings. |
| | Six species of threatened marine reptile were identified by the EPBC Protected Matters search (Section 4.3) for the ZPI.<br>Short-nosed seasnake, flatback, hawksbill, leatherback, green, and loggerhead turtles are widely dispersed in the continental shelf within the North-west marine region and in the unlikely event of a hydrocarbon spill occurring, individuals traversing open water may come into contact with entrained, dissolved aromatic or surface hydrocarbons. A number of turtle nesting beaches are within the ZPI which may receive accumulated hydrocarbons above 10 g/m² in the event of a leak scenario occurring over 365 days. The largest volume of accumulated hydrocarbons on sandy beaches is 14.9 tonnes at the Ningaloo Region. The number of hatchlings or transient adults encountering hydrocarbons at this volume are likely to be low and would not represent a significant proportion of the local population.<br>Given that hydrocarbons are expected to rapidly weather case and significant surface oil concentrations (no concentrations above 50 g/m²) are not predicted, relatively fresh surface, entrained and dissolved hydrocarbons (closer to the release location) are considered to have the greatest potential for impact. | | |
| Seabirds | Seabirds are particularly vulnerable to surface hydrocarbons. As most fish survive beneath floating slicks, they will continue to attract foraging seabirds, which | Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness. | Beached hydrocarbons pose a risk to species that utilise the shoreline for foraging. |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | typically do not exhibit avoidance behaviour. Smothering can lead to reduced water proofing of feathers and ingestion while preening. In addition, hydrocarbons can erode feathers causing chemical damage to the feather structure that subsequently affects ability to thermoregulate and maintain buoyancy on water.<br>Modelling in the blowout scenario indicates that the surface hydrocarbons concentrations are not predicted to exceed 25 g/m² concentrations. It is therefore predicted the impact area from surface hydrocarbons is confined to around the release site and not the wider region. In addition the weathering results for the variable-wind case (Figure 8-1) indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (<1% after 24 hours). Woollybutt crude also contains a relatively low proportion (6.5% by mass) of hydrocarbon compounds that will not evaporate at atmospheric temperatures.<br>Other spill scenarios surface impacts are considered to be within the above-mentioned distances. | May encounter entrained and dissolved aromatics while diving and foraging. | A variety of endemic and migratory bird species are dependent on the productive feeding grounds of the WA mangroves and intertidal flats. Some species are mangrove specialists, such as the mangrove robin, white-breasted whistler, mangrove honeyeater and mangrove kingfisher.<br>Shorebirds inhabit coastal mudflats and adjacent areas, and include the great knot, black-tailed godwit, lesser sand plover, bar-tailed godwit and grey-tailed tattler.<br>Ground nesting species may also be impacted. Direct contact with surface hydrocarbons can lead to irritation of skin and eyes. Smothering can lead to reduced water proofing of feathers leading to hypothermia. Smothering of feathers can also lead to excessive preening, diverting time away from other behaviours leading to starvation and dehydration. Preening of oiled feathers will also result into ingestion of hydrocarbons and the associated impacts of toxicity and potential illness.<br>Volumes of accumulated hydrocarbons on the shoreline are predicted from the leak scenario over 365 days. However, the volumes are low (maximum predicted volume of 14.9 tonnes in |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | | | the Ningaloo Region) and will steadily accumulate over a period of 365 days, the number of individuals potentially affected would be low. |
| | A number of bird species were identified by the EPBC Protected Matters search (Section 4.3) for the ZPI.<br>The following species have pollution as a key threat in their conservation advice:<br>• red knot, knot<br>• curlew sandpiper<br>• bar-tailed godwit (baueri), western Alaskan bar-tailed godwit<br>• northern Siberian bar-tailed godwit, bar-tailed godwit<br>• southern giant-petrel<br>• eastern curlew, far eastern curlew<br>• Australian fairy tern<br>• Tasmanian shy albatross.<br>Due to the rapid weathering and dispersion of the hydrocarbons, and the low surface concentrations predicted from the spill scenarios (no concentrations above 50 g/m² for a blowout scenario and no surface hydrocarbons above 10 g/m² for a leak scenario) significant impacts are not anticipated. Surface hydrocarbon impacts predicted at to be confined within 110 km from the spill site (crude release) and 75 km (diesel release) and weathering effects are expected to rapidly reduce surface hydrocarbons limiting the duration of seabird exposure. While Wedge-tailed Shearwater has a BIA for breeding over the ZPI, the area does not overlap the surface and the species is unlikely to be impacted given the localised area of surface hydrocarbons.<br>Given the relatively low likelihood of encounters between seabirds, the low surface hydrocarbon concentrations on the surface as a result of both a blowout and leak scenario band the rapid weathering of the hydrocarbon, impacts to seabirds in offshore waters are expected to consist of short term effects, such as reduced prey abundance. | | Reduced prey may be available to foraging shorebirds due to mortality or avoidance, and nesting individuals may be temporarily disrupted. |
| Fish and sharks | While fish and sharks do not generally break the sea surface, individuals may feed at the surface. However, since the Woollybutt crude and diesel is expected to weather rapidly and low surface concentrations are | Hydrocarbon droplets can physically affect fish and sharks exposed for an extended duration (weeks to months). Smothering through coating of gills can lead to the | |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | predicted from the spill scenarios (no concentrations above 50 g/m² for a blowout scenario, no surface hydrocarbons above 10 g/m² for a leak scenario), significant impacts are not anticipated. The probability of prolonged exposure to a surface slick by fish and shark species is low. | lethal and sub-lethal effects of reduced oxygen exchange, and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or contaminated food leading to reduced growth.<br>Site-attached fish, such as reef fish, have small home ranges and are at higher risk from hydrocarbon exposure than more wide-ranging species. The closest significant coral reefs to the Operational Area are found fringing the Barrow/Montebello Island groups, Muiron Islands and Ningaloo reef, which also occur within the ZPI. Entrained hydrocarbons may contact these locations however at low concentrations (<500 ppm concentration). The exact impact on resident fish populations at impacted shoals or reefs will be dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities.<br>There is potential for localised mortality of fish eggs and larva due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest and therefore demersal fish communities are not expected to be impacted. | |
| | The NWS supports a diverse assemblage of fish, particularly in shallower water near the mainland and islands. Threatened species identified by the EPBC protected matters search include blind gudgeon and blind cave eel (coastal and inlet species), manta ray, sawfish, grey nurse shark, | | |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | great white shark, porbeagle, whale shark, shortfin and longfin mako the which may be present in the ZPI. However, given the absence of critical habitat for most of these species, significant numbers are not expected to be impacted. A BIA for whale shark foraging overlaps the Operational Area and ZPI. The whale shark may occasionally feed within the operational area or ZPI at Ningaloo coast during April–November. | | |
| **Habitats** | | | |
| Sandy beaches (including intertidal and subtidal sand) | Hydrocarbons may accumulate on sandy beaches, impacting the area by physically smothering the habitat. Stranded oil may have toxic effects on invertebrates with knock on impacts on the shorebirds that forage upon them. | | Beached hydrocarbons may accumulate on sandy beaches, impacting the area by physically smothering the habitat. Stranded oil may have toxic effects on invertebrates with subsequent impacts on the shorebirds that forage upon them. Impacts to nesting turtles are described above. |
| | Sandy beaches have a relatively low biodiversity although they do provide important habitats for nesting turtles, breeding and foraging seabirds, and shorebirds. They also provide habitat for polychaetes, molluscs, marine crustaceans, semi-terrestrial crustaceans and insects.<br>Sandy beaches do not occur in the Operational Area but are widespread within the ZPI on Barrow/Montebello/Lowendal islands, Murion Islands and the mainland coast. A major green turtle rookery is located on the west coast of Barrow Island within the ZPI and one of the largest known flatback turtle rookeries in WA is located along the east coast of Barrow Island. The WA loggerhead turtle population nests on mainland beaches from Carnarvon to the Ningaloo Marine Park and offshore islands from Shark Bay to the Muiron Islands (Limpus, 2009). These beaches have the potential to be impacted from the leak scenario over 365 days (Section 8.6) which a maximum of 14.9 $m^3$ of Woollybutt crude being stranded on the Ningaloo coast. However, given the low volumes of shoreline accumulation the impacts are not considered significant. | | |
| Intertidal reefs (including coral communities, intertidal limestone pavement and macroalgae communities) | Intertidal reefs occur within the ZPI. The closest significant coral reefs to the Operational Area are found fringing the Barrow/Montebello Island groups, Muiron Islands and Ningaloo reef, which also occur within the ZPI. | | |
| | Surface hydrocarbons are not anticipated to make contact with intertidal reefs. | Physical effects from entrained oil have the potential to coat contacted coral reefs. The phenomena of smothering of exposed coral surfaces or polyps by oil spills has only been reported where very large oil spill quantities, or very sticky oil slicks, have been encountered. Response to | N/A |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | | hydrocarbon exposure can include impaired feeding, fertilisation, larval settlement and metamorphosis, larval and tissue death and decreased growth rates. Entrained oil also has the potential to impact reef fauna (fish, turtles, and marine mammals) as outlined in rows above. | |
| | Intertidal reefs occur within the ZPI and may potentially impacted by a spill. Entrained hydrocarbons may contact these locations however at low concentrations (<500 ppm concentrations). The exact impact will be dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. Given the concentrations predicted to contact the reef locations are low, significant impacts are not anticipated. | | |
| Mangroves | The shoreline is not considered to be a significant mangrove area. Isolated groups of mangroves are within the ZPI, particularly around Barrow Island and along the Ningaloo coastline. | | |
| | The impacts of surface hydrocarbons on mangroves include damage as a result of smothering of lenticels (mangrove breathing pores) on pneumatophores or prop roots, or by the loss of leaves (defoliation) due to chemical burning. It is also known that mangroves take up hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death. | Entrained hydrocarbons may potentially impact mangrove communities through the sediment/mangrove root interface. Entrained hydrocarbons contain contaminants that may become persistent in the sediments (e.g. trace metals, PAHs), leading to direct effects on mangroves due to direct uptake, or indirect effects due to impacts on benthic infauna and thus leading to reduced rates of bioturbation and subsequent oxygen stress on the plants root systems. | See 'Surface'. |
| | Isolated groups of mangroves occur within the ZPI potentially impacted by hydrocarbon spill. Significant impacts to mangrove habitats are not expected due to the entrained hydrocarbon concentrations reaching the shorelines and relatively low volumes of accumulated hydrocarbon from the leak scenario (maximum of 14.9 tonnes at the Ningaloo coast). | | |
| **Socioeconomic** | | | |
| Fisheries | In addition to the effects of entrained oil, petroleum safety zones/exclusion zones surrounding a spill can directly impact fisheries by restricting access for fishermen. | Entrained hydrocarbon can have toxic effects on fish (as outlined above) reducing | N/A |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| | | catch rates and rendering fish unsafe for consumption. | |
| | Both entrained and surface hydrocarbons have the potential to lead to temporary financial losses. | | N/A |
| Tourism | In the waters immediately surrounding the Operational Area, tourism activities are expected to be low. However, nearer shore areas there are many sources of marine-based tourism within the environment that may be affected. Most popular marine tourism activities include recreational fishing and diving/snorkelling. Ningaloo is the most significant area in the NWS region for nature-based tourism.<br>Petroleum safety zones/exclusions surrounding a spill will reduce access for vessels for the duration of the response undertaken for spill clean-up (if applicable). | | Stranding of hydrocarbons on sandy beaches is anticipated to be very low (maximum of 14.9 tonnes at the Ningaloo coast) and over period of 365 days. Tourism activity on the Ningaloo beaches is high, particularly around Cape Range National Park, however given the low volumes of accumulated hydrocarbons impact is not anticipated to be significant. |
| Shipping | Petroleum safety zones/exclusions surrounding a spill will reduce access for shipping vessels for the duration of the response undertaken for spill clean-up (if applicable); vessel may have to take large detours leading to potential delays and increased costs. | Entrained oil will have no effect on shipping. | N/A |
| Defence | The level of defence activities carried out is in the airspace only, therefore interference of defence activities due to a hydrocarbon spill are likely to be minimal. | | Beached hydrocarbons will have no impacts on defence activities. |
| Shipwrecks | Surface oil will have no impact on shipwrecks. Entrained oil from a vessel collision will remain in the surface waters and is therefore unlikely to have an impact on shipwrecks. | | N/A |
| Indigenous | The level of activities undertaken by indigenous users is expected to be low. Along the north-western coastline of Australia, traditional and subsistence fishing is generally limited to shorelines, creeks and nearshore reefs (Leprovost *et al.,* 1997). Interference due to a hydrocarbon spill are likely to be minimal, however in event there is a requirement for land-based response activities/ disturbance relevant representatives will be contacted. | | Stranding of hydrocarbons and response activities may impact indigenous values of land masses. |
| Existing oil and gas activity | Petroleum safety/exclusion zones surrounding spills will reduce access potentially leading to delays to work schedules with subsequent financial implications. | | N/A |

| Receptor | Impacts of a hydrocarbon spill | | |
|---|---|---|---|
| | **Surface** | **Entrained and dissolved aromatic hydrocarbons** | **Shoreline** |
| **Protected Areas** | | | |
| Protected areas | The ZPI overlaps several KEFs (Section 4.5.3). The following KEFs could be contacted at the thresholds described in Table 4-1.<br>• Continental Slope Demersal Fish Communities – the eggs/larvae fish within these communities could be impacted from direct contact with entrained hydrocarbons.<br>• Commonwealth waters adjacent to the Ningaloo Marine reserve<br>• Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula -Aggregations of pelagic species, including whale sharks, manta rays, humpback whales, sharks, large predatory fish and seabirds, may be impacted by entrained and surface hydrocarbons as described above;<br>• Ancient coastline at 125 m depth contour –May support enhanced productivity and may attract opportunistic feeding by larger marine life including humpback whales, whale sharks and large pelagic fish, these species could be impacted by entrained or surface hydrocarbons;<br>• Exmouth Plateau –May support enhanced productivity supporting pelagic fish species and potentially sperm whales. Pelagic fish and sperm whales may be contacted by entrained hydrocarbons as described above. | | |
| Commonwealth and State Marine Protected Areas | Protected areas within the ZPI are detailed within Section 4.5, and include:<br>• Gascoyne AMP<br>• Ningaloo AMP<br>• Montebello AMP<br>• Ningaloo Marine Park and Murion Island Management Area<br>• Montebello Islands Marine Park, Barrow Island Marine Park and Barrow Island Marine Management Area.<br>As discussed above, marine mammals, seabirds, sharks and reptiles within protected areas are at risk of direct contact with hydrocarbons due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces. | | Potential impacts of beached hydrocarbons on receptors listed in each protected area are described in rows above. |

#### 8.5.4.1 Impacts to Value of the Australian Marine Parks

The AMPs within the ZPI are:

- Gascoyne AMP
- Ningaloo AMP
- Montebello AMP
- Shark Bay.

Potential impacts may include: the contamination of sediments, impacts to benthic fauna/habitats and associated impacts to fish populations and reduced biodiversity. However, given the low concentrations the AMPs are anticipated to receive and the low persistent fraction (6.5%) of the crude (see Table 8-5) it is not anticipated the AMP will be significantly impacted. However, the values (Section 4.5.1) which may be impacted for a period include:

- natural values
- cultural values
- socio economic values.

The below discuss the impact to each of the values:

**Natural Values**

The key ecological feature in the Montebello AMP is the ancient coastline at the 125-m depth contour where rocky escarpments are thought to provide biologically important habitat in areas otherwise dominated by soft sediments. In addition, the AMP includes Trial Rocks, a prominent seafloor feature consisting of two close coral reefs. The reefs are emergent at low tide. These features may be impacted from entrained hydrocarbon at low concentrations.

The Ningaloo AMP includes three key ecological features:

- canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula
- Commonwealth waters adjacent to Ningaloo Reef
- continental slope demersal fish communities.

The Ningaloo AMP is located in a transition zone between tropical and temperate waters and sustains tropical and temperate plants and animals, with many species at the limits of their distributions. Impacts to these species have been discussed in Table 8-8.

The Gascoyne AMP includes four key ecological features:

- canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula
- Commonwealth waters adjacent to Ningaloo Reef
- continental slope demersal fish communities

- Exmouth Plateau – a regionally and nationally unique deep-sea plateau in tropical waters.

The Gascoyne AMP supports a diverse range of marine fauna species and benthic slope communities which may receive entrained hydrocarbons at low concentrations. Impacts to these species have been discussed in Table 8-8.

The ZPI extends to the northern point of the Shark Bay AMP. Key features of the AMP include:

- diverse seagrass assemblages
- an estimated population of about 11,000 dugongs
- populations of bottlenose dolphins
- green turtle and loggerhead turtle, which nest on the beaches.

Impacts to the range of species and habitats which AMPs supports has been discussed in Table 8-8. The susceptibility of marine fauna to hydrocarbons is dependent exposure duration, however given that exposures would be limited in extent (maximum extent of surface hydrocarbons at the 1 g/m² threshold concentration is 110 km and no surface hydrocarbons exceed 10 g/m²) and duration (the hydrocarbons are expected to weather rapidly in a variable wind scenario, see Section 8.5.3, exposure to marine fauna from this hazard is not expected to result in a fatality.

**Cultural Values**

Sea country is valued for indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Gascoyne and Ningaloo AMPs. There is limited information about the cultural significance of the Montebello AMP.

As described above, the spill will impact the AMPs for a short period, whilst the hydrocarbon disperses and weathers, however lasting impact is not anticipated.

**Socio-Economic Values**

Tourism, commercial fishing and recreation including fishing, are important activities in the AMPs. As described above a crude spill will impact the AMPs for a short period, whilst the crude disperses and weathers, however lasting impact is not anticipated.

### 8.5.5 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no loss of well control leading to a hydrocarbon release to the marine environment
- no loss of containment of hydrocarbons to the marine environment (EPO-13).

Control Measures relating to this risk include:

- Accepted Well Operations Management Plan (WOMP) (CM-19)
- Safety Case (CM-20)
- Well Control Equipment (WCE) specification and function testing is undertaken (CM-21)
- Eni Source Control Response Plan (ENI-WOP-PL-001) (CM-22)
- Mutual Aid MoU for relief well drilling is in place which allows for expedited use of drilling rig for relief well drilling (CM-23)
- Relevant well site personnel hold International Well Control Forum certificates (CM-24).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.5.6 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate P&A activity | Eliminating the P&A activity will remove the risk, however other spill risks being more likely should P&A be eliminated. | × |
| Substitute | No substitutes are available to access the reservoir for P&A | N/A. | N/A |
| Engineering | Accepted Well Operations Management Plan (WOMP) | Multiple barriers in place in the well (as per WOMP), reducing the likelihood of a release occurring.<br>Reduces likelihood of loss of well control.<br>At least two isolation barriers are in place between the reservoir and the environment, reducing the likelihood of a release occurring. A release may occur in the unlikely event of simultaneous failure of all barriers and cannot be isolated further. | ✓ |
| Isolation | No substitutes are available to access the reservoir | N/A. | N/A |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/management** | **Evaluation** | **Adoption?** |
| Administrative | Safety Case | Accepted Safety Case includes control measures for well control that reduce the risk of an unplanned release of hydrocarbons.<br>The safety case includes design control measures for well control that reduce the risk of an unplanned release of hydrocarbons.<br>Is a legislative requirement to have an approved safety case in place under the OPGGS Act. | ✓ |
| | Well Control Equipment (WCE) specification and function testing | Testing of the WCE will reduce the likelihood of a blowout resulting in release of hydrocarbons to the marine environment.<br>Minor cost involved in testing the WCE. | ✓ |
| | Eni Source Control Response Plan (ENI-WOP-PL-001) is in place and details steps to expedite the drilling of a relief well, including:<br>• relief well design<br>• simulation of the dynamic kill<br>• high-level requirement for the rig and the equipment, volumes and the pumping pressures. | Following the Source Control Response Plan in the event of a loss of well control will reduce the time taken control the well, limiting the volume released to the environment. | ✓ |

### 8.5.7 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011: Accepted Well Operations Management Plan (WOMP).<br>Subsea WCE function testing in accordance with API Standard 53, 4th Edition.<br>Mutual aid MoU for relief well drilling is in place.<br>Well Blowout Contingency Plan is in place in accordance with Eni.<br>EPBC approval conditions (EPBC 2001/365) were considered for this risk. Condition number 3 relates to potential spills. The Woollybutt OPEP (000105_DV_PR.HSE.1045.000) is considered to meet this condition. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to a subsea release of Woollybutt crude. |
| Area Sensitivity/ Biodiversity | See Section 8.5.4.<br>In the unlikely event of a subsea Woollybutt crude spill, ZPI may include open water and shorelines. Marine fauna may traverse open water impacted by a spill. Impacts to transient marine fauna within the vicinity of the spill include the potential to impact air breathing animals such as cetaceans, turtles and sea snakes due to of inhalation of vapours if they surface in the slick. Seabirds have also been identified as at risk if they contact surface hydrocarbons by oiling their feathers leading to loss of buoyancy and the potential for hypothermia.<br>Stranded hydrocarbons may accumulate on intertidal and shoreline habitats. This can reduce plant health leading to a reduction in habitat quality with secondary impacts to the fauna communities they support. However, the volumes potentially accumulated are small and the implementation of response strategies will reduce the volume and exposure time of habitats by Woollybutt crude, reducing potential impacts.<br>Habitat modification/degradation/disruption/loss, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). However, with controls in place the objectives of the Recovery Plans and Conservation Advice will be met. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

In the unlikely event of a well blowout, the potential impacts to the environment would be greatest several kilometres from the spill when the toxic aromatic components of the Woollybutt crude will be at their highest concentration and when the crude at its thickest on the surface of the receiving waters. The crude will also rapidly lose toxicity with time and spread thinner as evaporation and weathering continues. The potential sensitive receptors in the surrounding areas of the spill will include fish, marine mammals, marine reptiles and seabirds at the sea surface, as discussed in Section 4.3. The impact assessment has determined that there is unlikely to be a major long-term environmental

impact on the offshore environment or sensitive nearshore and shoreline habitats from a loss of well control.

Habitat modification/degradation/disruption/loss, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). The potential impacts of a hydrocarbon release are discussed in Table 8-8. Physical contact with hydrocarbons from a spill from the P&A activities to marine fauna is likely to have biological consequences however it is unlikely to affect an entire population and not predicted to impact on the overall population viability.

The P&A of the WB4 well is consistent with applicable laws, policies, standards and conventions. An accepted WOMP and MoU for relief well drilling will be in place for all Woollybutt wells. Since the daily rate of an MODU is approximately $555,000 per day, the cost of having an MODU on standby is disproportionate to the environmental benefit (Table 8-19).

Given the low maximum concentrations of hydrocarbons reaching the AMPs and low residuals in the hydrocarbon (Table 8-4) it is not anticipated that the values of the AMPs detailed in Section 4.5.1 will be compromised or be significantly impacted from a from a well blow-out event.

There are no practical alternatives to eliminating or substituting the risks. By intervening and plugging the WB4 well the risk of future releases will be mitigated. The main ALARP justification is therefore engineering and administrative.

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk of a crude spill was classified as medium, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Given the short duration of the activity, the rare likelihood of a release occurring with the controls that will be implemented, Eni considers that the risk of a hydrocarbon release is acceptable and managed to ALARP.

## 8.6 Subsea Release of Crude – Field Management (Risk ID 13)

### 8.6.1 Summary of Environmental Impact

| Hazard | Subsea release of crude | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 4 | MH |
| Residual Risk | A | 4 | M |

### 8.6.2 Description of Hazard

A subsea release of crude could occur during field management in the unlikely event the failure of subsea HXT valves leads to the external leakage of hydrocarbons to the environment.

All four suspended shut in wells were producing with assistance of gas lift. Of four suspended shut in wells, WB4 is the only well that currently has the potential of flowing naturally and therefore a leak scenario is applicable to this well only. The other three wells can produce limited gas/oil/water (due to the presence of small gas cap in the well) and will be then naturally killed by the hydrostatic of the water produced from the reservoir.

An external specialist (Exprosoft) was engaged to provide a quantitative risk assessment of the leak path probability of occurrence based on the industry recognised OREDA reliability database.

The study shows that there are multiple leak pathways with various probability of occurrence. The below schematics (Figure 8-11 and Figure 8-12) show the various leak paths from reservoir to the environment.

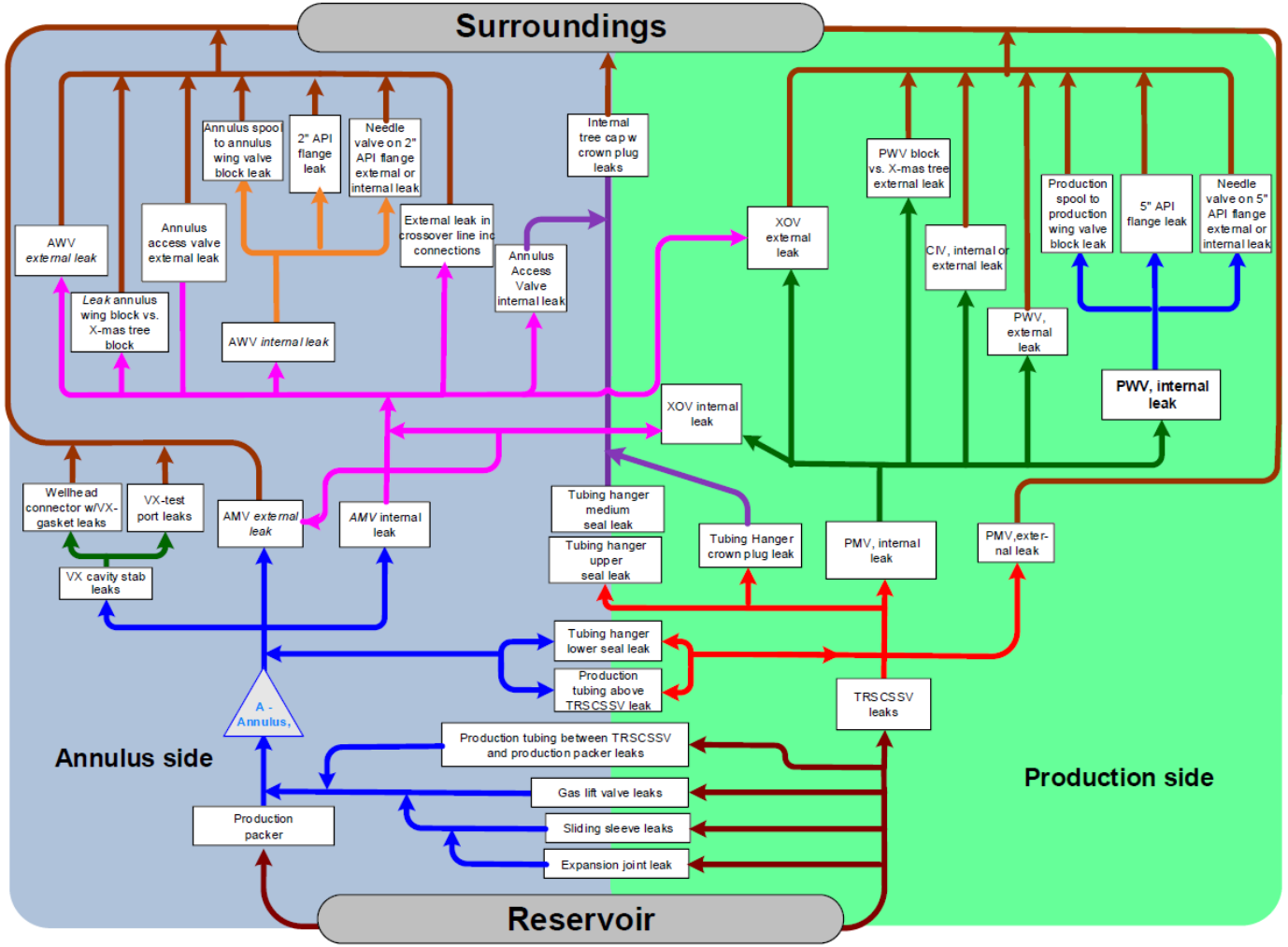



**Figure 8-11: Various leak paths from WB4 reservoir to the environment**

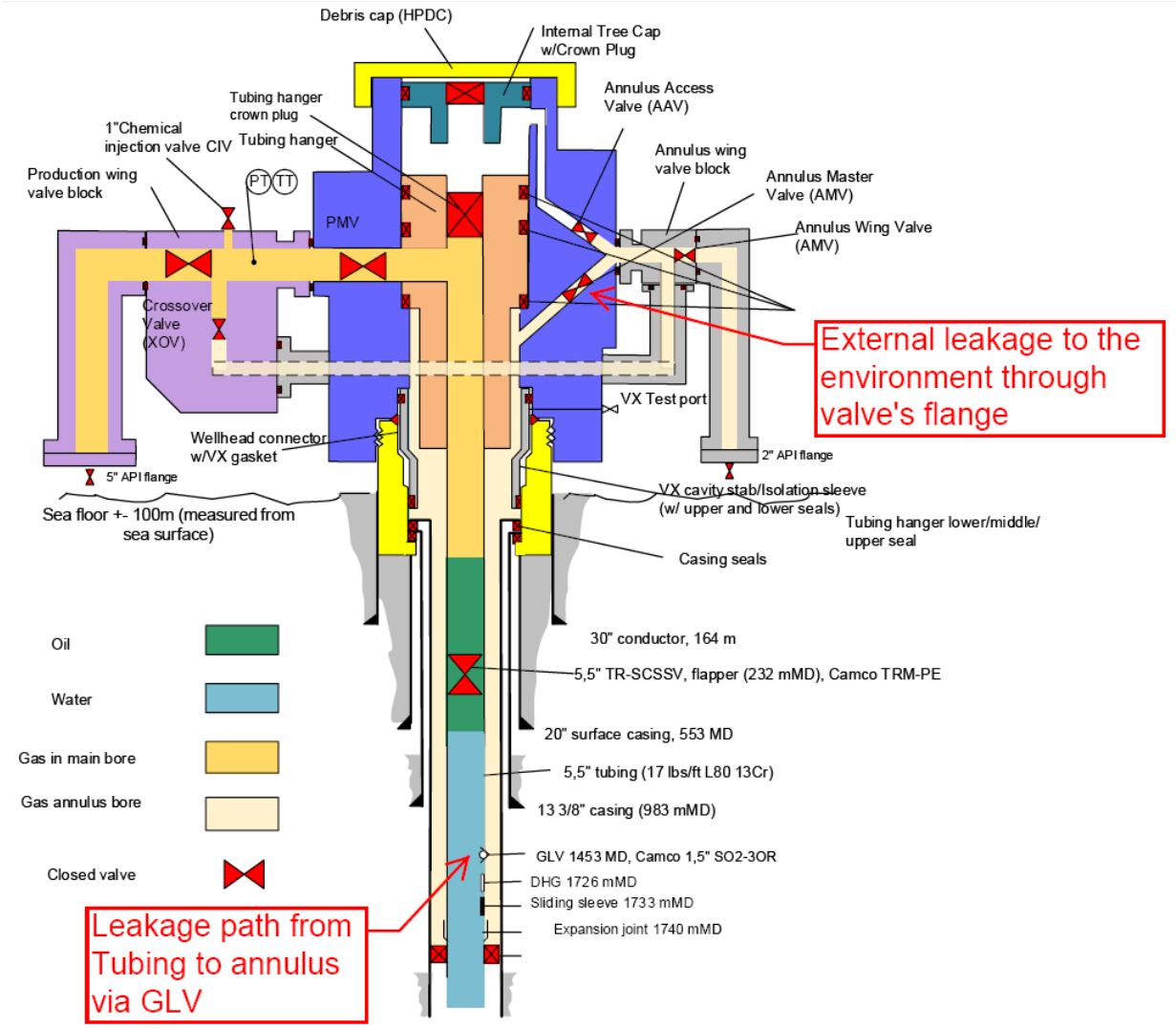



**Figure 8-12: Typical Woollybutt well integrity schematic & the most probable leak path**

## Simultaneous Failure of the GLV and the Annulus Master Valve

A leak to the marine environment is remotely possible as a result of simultaneous failure of the GLV and the flange sealing face on the annulus master valve. The WB4 well is the only free flowing well; therefore, the release of crude is applicable to this well only.

Spill Scenarios

Corrosion of the valves would happen gradually over time. Initial leaks would be small with gradual rise in flow rate as corrosion increases.

GVI surveys are conducted regularly as per Section 3.5.3 to evaluate the integrity of the infrastructure. This survey would detect any leaks from the tree. In the meantime, Synthetic Aperture Radar (SAR) satellite imagery will be implemented to detect the surface expression of potential hydrocarbon leaks from the Woollybutt subsea infrastructure. Processing of SAR data will occur every 14 days and is able to detect

surface slicks of 5 µm or greater. Oil spill modelling conducted by GHD on behalf of Eni concluded that SAR will likely detect spills greater than 250 bpd.

Due to the processing interval, there could be a 14 day delay before a leak > 250 bpd is detected. Given the gradual onset of the leak, it is not credible that the flow rate reach 900 bpd within 14 days or before response strategies (as outlined in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000)) have contained the leak.

In summary, to appropriately assess the impacts of this hazard, two credible oil spill scenarios were identified:

3. A small leak of < 250 bpd at WB4 until well P&A occurs. (A Subsea release of Woollybutt crude during field management due to corrosion and valve failure, equating to 14,490.5 m³ over 365 days)

   A leak scenario < 250 bpd at the WB4 well is credible for the duration it goes undetected. A worst-case duration the leak could go undetected is until the next field management (1 year). There is also potential that the leak would be realised prior to this through the following:

   - Detection of oil on the shoreline, leading to an investigation of the source which traces the spill to the WB4 well.
   - The SAR detecting a leak <250 bpd.
   - Other vessels in the vicinity of the Woollybutt field reporting a sheen on the sea surface, leading to an investigation of the source which traces the spill to the WB4 well.

4. A larger leak of up to 900 bpd at WB4 for up to 88 days (A Subsea release of Woollybutt crude during field management due to corrosion and valve failure, equating to 12,592 m³ over 88 days, assuming a leak rate of ~250 bpd in the first 14 days).

   This scenario is only credible until P&A occurs, which is planned as per the schedule in Section 3.4.2. Prior to P&A of WB4, a leak 900 bpd at the WB4 well is credible for up to 88 days. This is based on a subsea leak, leading to a 900 bpd release and it being detected at 14 days through SAR and a relief well drilling being required to contain the spill (74 days). Leaks > 250 bpd will be detected through SAR after 14 days; however, may be detected sooner through other vessels in the vicinity of the Woollybutt field reporting a sheen on the sea surface, leading to an investigation of the source which traces the spill to the WB4 well.

   Once a > 250 bpd leak is detected from WB4 an investigation will ensue and the applicable response strategy as detailed in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) will be applied.

   The leak rate will be dependent on the tortuous path through the 3 leak points (upper, lower plugs and SCSSV) and dominated by the ratio of the smallest orifice to the larger ones. The leak would start as a very small pinhole leak, over time growing to 900 bpd full bore release. It is noted that a leak is least likely to occur immediately after an inspection has verified the integrity of the equipment and valves.

Modelling presented in Section 8.5.3 (900 bpd well blowout for 74 days) and Section 8.6.3 (250 bpd leak for 365 days) is determined to present a ZPI suitable for predicting impacts of a 900 bpd leak scenario for 88 days and has been determined applicable to inform the response strategies in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) and the impact assessment throughout this EP.

### 8.6.3 Oil Spill Modelling

A 14,490.5 m³ Woollybutt crude release was modelled by GHD (2016) at the WB4 over 365 days. Therefore, the modelling presents a duration of undetected leak much greater than what is credible. In addition, any leak would start as very small pinhole leak (near zero flow rate). A leak may grow due to erosion along the leak path. However, the low reservoir pressure and low initial leak flow rate would likely mean any increase in the leak size or flow rate would be slow or limited. Therefore, considering the leak rate must start near zero, the assumption of a constant leak rate overestimates the total volume by at least 100%. The modelling outputs are therefore viewed as highly conservative, however determined acceptable for worst case response planning.

A total of 23 individual stochastic realisations were simulated, which is considered reasonable due to the long release duration of hydrocarbon (1 year). For each of the 23 stochastic realisations, OSCAR separately tracks the components of surface oil, entrained oil droplets and dissolved oil in the water column, and oil on shorelines throughout the model domain. The modelling is considered appropriate, although conservative, for informing the approximate spatial extent of potential impacts from a leak event.

Table 8-9 presents the parameters and justification used in the modelling.

**Table 8-9: Summary of parameter and justifications for leak spill modelling**

| Parameter | Description and justification |
|---|---|
| Number of spill simulations | 23 individual stochastic realisations |
| Hydrocarbon Type | Kristin crude (representative hydrocarbon, discussed further in Section 8.4.1) |
| Release Type | Leak scenario |
| Total spill volume | 14,490.5 m³ over 365 days |
| Spill volume justification | Leak scenario of 250 bpd, volume which is unable to be detected via satellite imagery and may be left undetected until ROV inspection |
| Release Depth | Subsea |
| Release Depth justification | Only credible spill scenario is from subsea, the subsea HXT is on the seabed |
| Release duration | 365 days |

#### 8.6.3.1 Shoreline Hydrocarbons

Shoreline hydrocarbons exceeding 10 g/m² were predicted between the Carnarvon Region and Barrow Island (Figure 8-13). Moderate to high contact probabilities (60 to 100%) were predicted for this threshold at Barrow Island, Muiron Islands, the

Montebello Islands and the Ningaloo Region (Figure 8-13, Table 8-10). The maximum time-averaged shoreline loadings predicted at these receptors when above the 10 g/m² threshold were 14.9, 5.5, 3.2 and 1.6 tonnes at the Ningaloo Region, Barrow Island, the Muiron Islands and the Montebello Islands, respectively (Figure 8-13, Table 8-10). Thevenard Island, the Onslow Region, the Lowendal Islands and the Carnarvon Region were also predicted to receive hydrocarbons exceeding 10 g/m²; however, contact probabilities at these receptors were low (13 to 35%) and total shoreline loadings were below 0.5 tonnes.

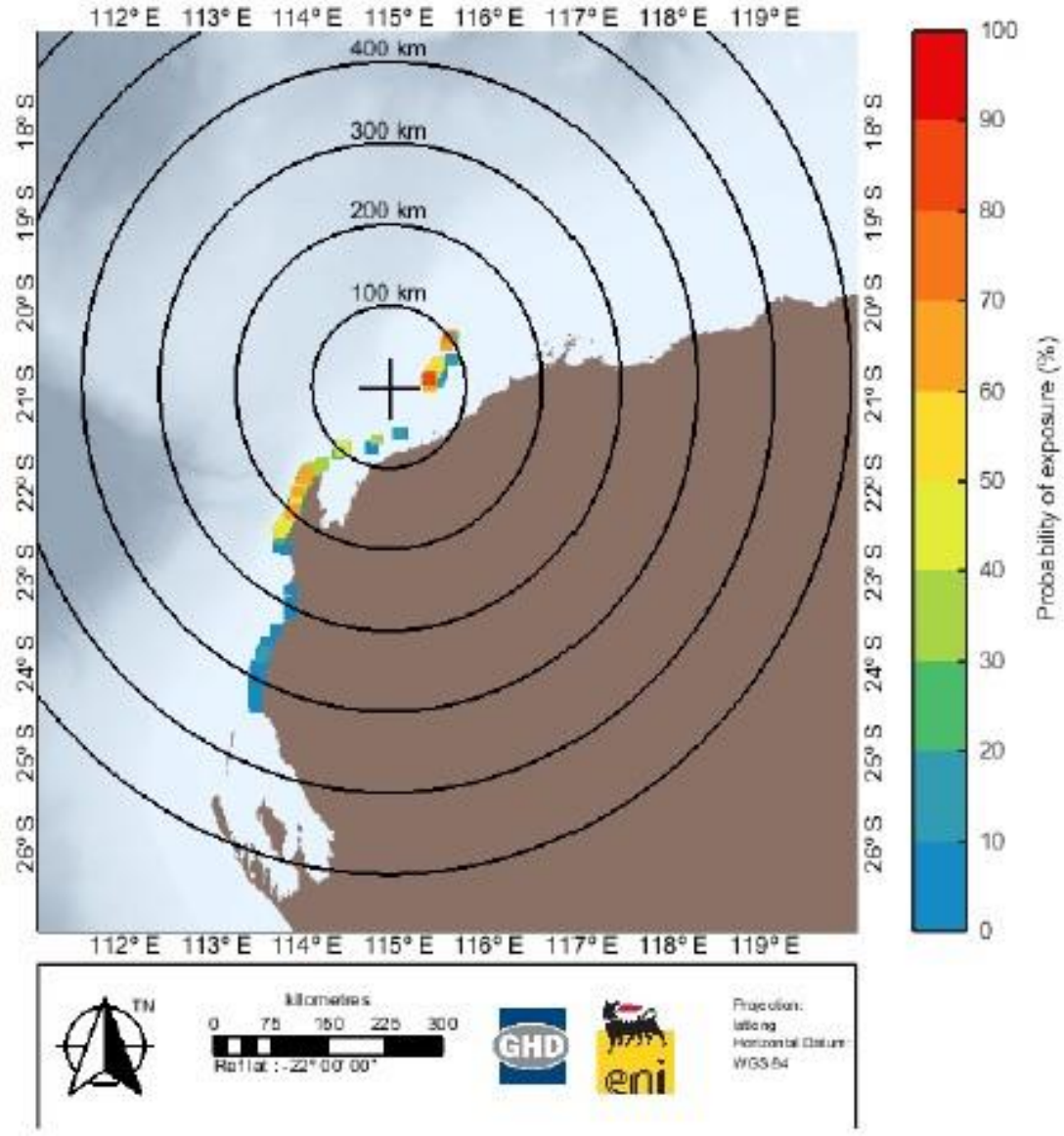



**Figure 8-13: Probability of oil on shorelines above 10 g/m²**

**Table 8-10: Summary results for oil on shorelines above 10 g/m²**

| Receptor | Total Probability Exposure (%) | | | | | Maximum total time-averaged shoreline mass (tonnes) | | | | | Minimum Arrival Time (days) | | | | | Maximum contacted shoreline length (km) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | **Yearly** | Q1 | Q2 | Q3 | Q4 | **Yearly** | Q1 | Q2 | Q3 | Q4 | **Yearly** | Q1 | Q2 | Q3 | Q4 | **Yearly** |
| Barrow Island | 100 | 100 | 100 | 100 | **100** | 2.3 | 3.5 | 5.5 | 4.6 | **5.5** | 14.8 | 5.9 | 61.4 | 6.2 | **5.9** | 28.9 | 31.5 | 47.2 | 36.7 | **47.2** |
| Thevenard Island | NC | 25 | 28.6 | NC | **17.4** | NC | 0.1 | 0.1 | NC | **0.1** | NC | 251.8 | 153.9 | NC | **153.9** | NC | 2.6 | 2.6 | NC | **2.6** |
| Muiron Islands | 50 | 50 | 71.4 | 75 | **60.9** | 2.4 | 2.2 | 2 | 3.2 | **3.2** | 5.4 | 53.6 | 106.8 | 33.8 | **5.4** | 10.5 | 7.9 | 10.5 | 10.5 | **10.5** |
| Onslow Region | 25 | 37.5 | 42.9 | 25 | **34.8** | <0.1 | 0.4 | 0.3 | 0.1 | **0.4** | 5.5 | 184.5 | 106.8 | 34.1 | **5.5** | 2.6 | 5.2 | 2.6 | 5.2 | **5.2** |
| Montebello Islands | 75 | 100 | 100 | 100 | **95.7** | 0.9 | 1.6 | 0.7 | 1.1 | **1.6** | 42.9 | 10.5 | 77.2 | 4.3 | **4.3** | 10.5 | 18.4 | 7.9 | 13.1 | **18.4** |
| Lowendal Islands | 25 | 12.5 | 14.3 | NC | **13** | <0.1 | 0.2 | <0.1 | NC | **0.2** | 297.6 | 150.2 | 78.1 | NC | **78.1** | 2.6 | 2.6 | 2.6 | NC | **2.6** |
| Ningaloo Region | 100 | 87.5 | 85.7 | 75 | **87** | 11.5 | 14.7 | 14.9 | 13.5 | **14.9** | 5.1 | 55.7 | 106.9 | 34.3 | **5.1** | 86.6 | 89.2 | 60.4 | 57.7 | **89.2** |
| Carnarvon Region | 50 | 25 | 28.6 | 25 | **30.4** | <0.1 | 0.5 | 0.3 | 0.1 | **0.5** | 27.3 | 227.6 | 154.1 | 81.4 | **27.3** | 2.6 | 13.1 | 7.9 | 5.2 | **13.1** |

### 8.6.3.2 Surface Hydrocarbons

Surface hydrocarbons were predicted to travel up to 110 km when exceeding the 1 g/m² threshold (Figure 8-14). No sensitive features or Australian Marine Parks were predicted to be contacted by surface oil above this threshold.

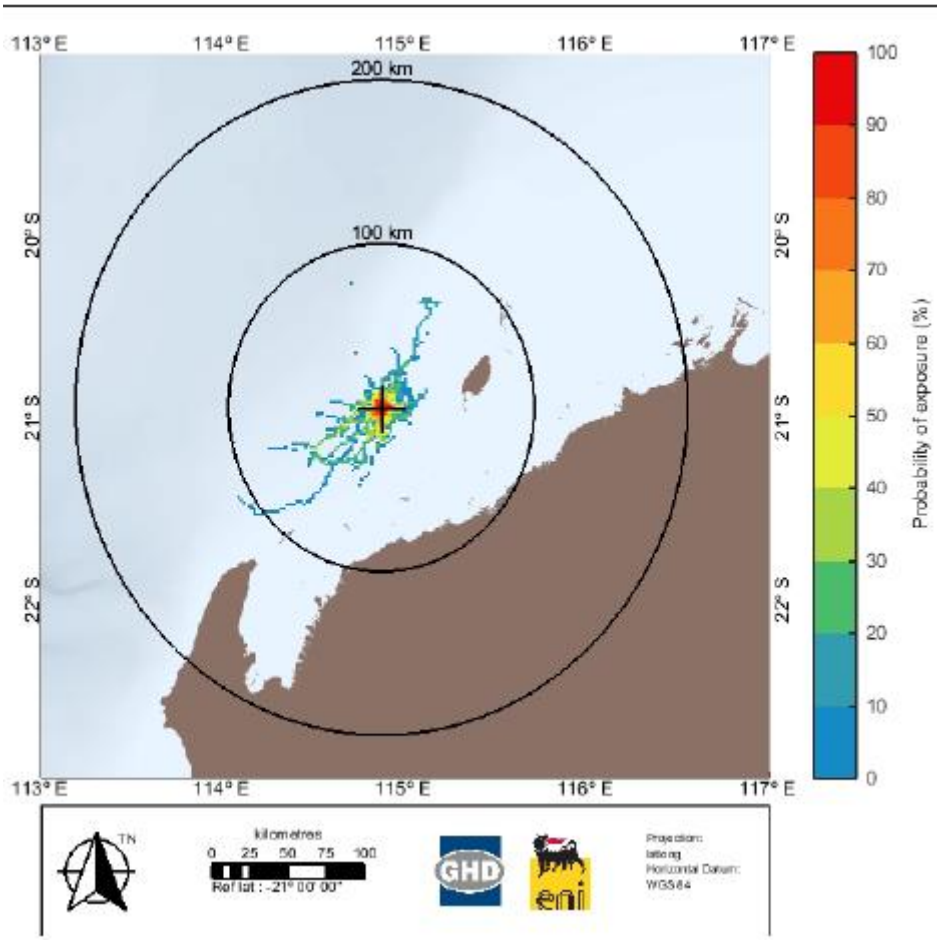



**Figure 8-14: Probability of surface hydrocarbons above 1 g/m²**

### 8.6.3.3 Subsurface – Entrained Hydrocarbons

The majority of the total WAF exceeding 70 ppb was within 70 km of the release location (Figure 8-15), with only two other model cells contacted above this threshold near the Ningaloo shoreline, approximately 150 km from the release location. As such, 21.7% of realisations predicted contact by total WAF above 70 ppb in the Ningaloo region as well as the Ningaloo Marine Park (Table 8-11).

However, the maximum predicted concentration predicted at these locations was 74.1 ppb, with a maximum exposure time of 0.2 days. The KEFs of the Ancient Coastline and the CSDFC were predicted to be contacted by total WAF exceeding 70 ppb in 100% of realisations. The maximum time-averaged concentrations in these regions were predicted to be 154.8 ppb and 111.6 ppb at the Ancient Coastline and the CSDFC respectively; however, exposure times were predicted to be a maximum of 1.1 cumulative days across the entire year of simulation (Table 8-11).

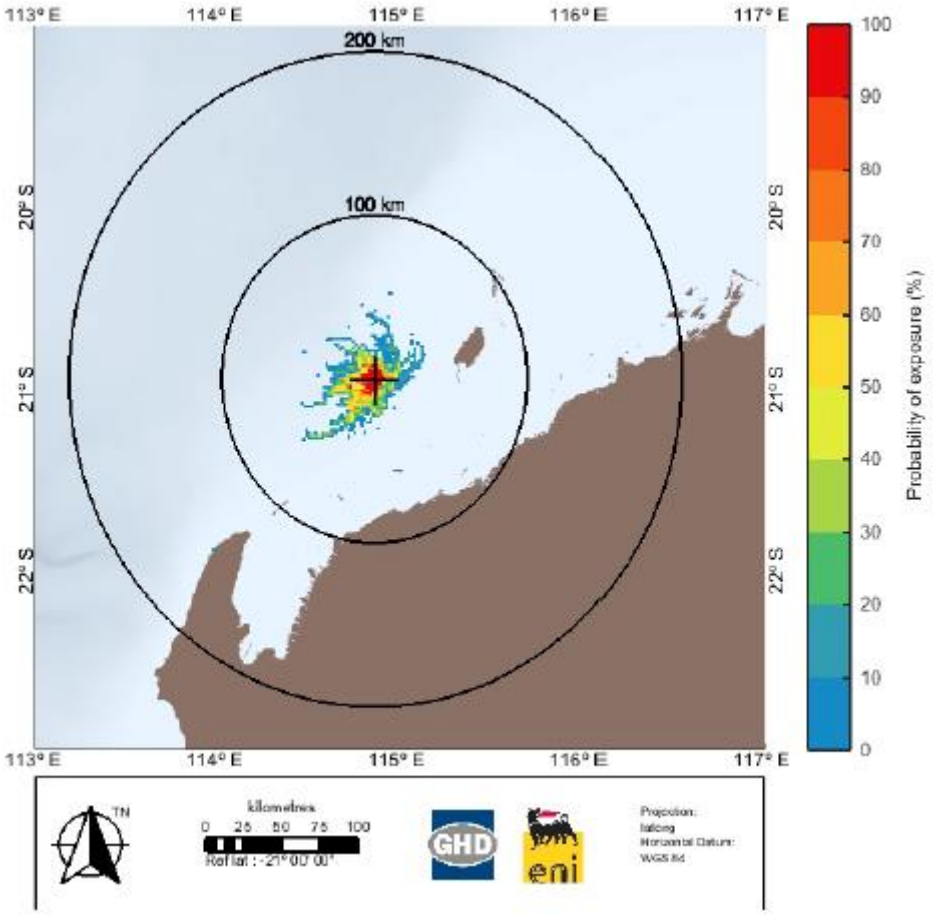



**Figure 8-15: Probability of total WAF above 70 ppb**

**Table 8-11: Summary of stochastic results for total WAF when above 70 ppb**

| Receptor Type | Receptor | Total Probability of Exposure (%) | | | | | Maximum Time-Averaged Concentration (ppb) | | | | | Maximum Exposure Time (days) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Q1* | *Q2* | *Q3* | *Q4* | ***Yearly*** | *Q1* | *Q2* | *Q3* | *Q4* | ***Yearly*** | *Q1* | *Q2* | *Q3* | *Q4* | ***Yearly*** |
| Geographic features | Ningaloo Region | 25 | 25 | 28.6 | NC | **21.7** | 74.1 | 72.6 | 70.6 | NC | **74.1** | 0.2 | 0.2 | 0 | NC | **0.2** |
| Protected areas | Ningaloo Marine Park | 25 | 25 | 28.6 | NC | **21.7** | 74.1 | 72.6 | 70.6 | NC | **74.1** | 0.2 | 0.2 | 0 | NC | **0.2** |
| Key Ecological Features | Ancient coastline at 125 m depth contour | 100 | 100 | 100 | 100 | **100** | 140.2 | 154.8 | 135.6 | 134.2 | **154.8** | 1.1 | 1.1 | 1 | 1 | **1.1** |
| | Continental Slope Demersal Fish Communities | 100 | 100 | 100 | 100 | **100** | 98.2 | 111.6 | 104.8 | 104.1 | **111.6** | 0.2 | 0.4 | 0.3 | 0.3 | **0.4** |

#### 8.6.3.4 Subsurface – Dissolved Aromatics

Dissolved hydrocarbons exceeding 6 ppb were predicted to travel up to 130 km from the release location (Figure 8-16). No geographic features or Australian Marine Parks were predicted to be contacted by dissolved hydrocarbons exceeding the 6 ppb thresholds.

The KEFs of the Canyons, the Ancient Coastline and the CSDFC were predicted to have a high probability (82 – 100%) of contact by dissolved hydrocarbons above 6 ppb (Figure 8-16). The maximum time-averaged concentrations when above 6 ppb for the Canyons and the CSDFC were predicted to be 19.7 ppb and 16.8 ppb, respectively, however the maximum exposure time in these receptors was 0.2 and 0.7 days, respectively. The Ancient Coastline was predicted to have a higher maximum time-averaged concentration of 34.4 ppb and a longer exposure duration of 25.1 days for dissolved hydrocarbons exceeding 6 ppb.

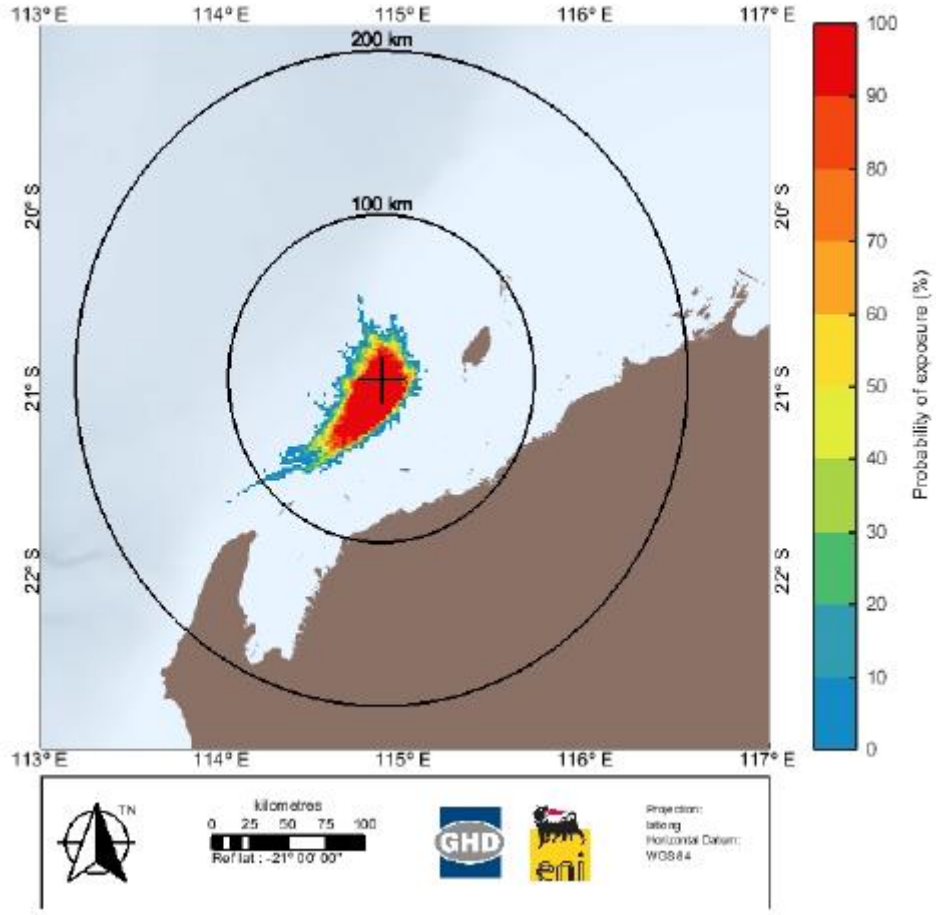



**Figure 8-16: Probability of dissolved WAF above 6 ppb**

**Table 8-12: Summary of stochastic results for dissolved WAF when above 6 ppb**

| Receptor Type | Receptor | Total Probability of Exposure (%) | | | | | Maximum Time-Averaged Concentration (ppb) | | | | | Maximum Exposure Time (days) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Q1* | *Q2* | *Q3* | *Q4* | ***Yearly*** | *Q1* | *Q2* | *Q3* | *Q4* | ***Yearly*** | *Q1* | *Q2* | *Q3* | *Q4* | ***Yearly*** |
| Key Ecological Feature | Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula | 75 | 75 | 100 | 75 | **82.6** | 16.1 | 16 | 19.7 | 11 | **19.7** | 0.1 | 0.1 | 0.2 | 0.1 | **0.2** |
| | Ancient coastline at 125 m depth contour | 100 | 100 | 100 | 100 | **100** | 28.2 | 31.8 | 34.4 | 22.8 | **34.4** | 25.1 | 23.3 | 22.4 | 25.1 | **15.1** |
| | Continental Slope Demersal Fish Communities | 100 | 100 | 100 | 100 | **100** | 14.2 | 12 | 16.8 | 11 | **16.8** | 0.6 | 0.7 | 0.7 | 0.7 | **0.7** |

### 8.6.4 Potential Environmental Impact

The potential impacts of a subsea release of a hydrocarbon release are described in full in Table 8-8. The description of impacts covers all sensitivities occurring within the ZPI. This includes shoreline receptors resulting from shoreline accumulation of hydrocarbons > 10 g/m² as a result of a 250 bpd leak scenario for 365 days.

In the event of a 250 bpd leak scenario for 365 days, the volume of crude released would be a maximum of 14,490.5 m³. Given the nature of the crude and the distance from shorelines, dilution and dispersion from natural weathering processes such as ocean currents and wind indicate that the extent of surface exposure will be limited to 110 km from the release site (> 1 g/m² threshold concentration). Hydrocarbons above the ≥ 10 g/m² threshold concentrations may accumulate on the shorelines of islands and the mainland (as identified in Table 8-10), with a maximum accumulation of 14.9 tonnes on the Ningaloo coast and 5.5 tonnes at Barrow Island. Shoreline impact above the ≥ 100 g/m² threshold that could impact the survival and reproductive capacity of intertidal benthic epifaunal (French-McCay, 2009) was met at Barrow Island, Murion Islands, Montebello Islands and Ningaloo region.

The susceptibility of marine fauna to the crude is dependent on exposure duration, however given that exposures would be limited in extent and duration, exposure to marine fauna from this hazard is not expected to result in a fatality.

Impacts to the value of the AMPs within the ZPI have been discussed in Section 8.5.4.

### 8.6.5 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no loss of containment of hydrocarbons to the marine environment (EPO-13).

Control Measures relating to this risk include:

- accepted Well Operations Management Plan (WOMP) (CM-19)
- satellite imagery will be processed every 14 days to detect surface slicks greater than 5 µm (CM-25)
- field management (CM-4)
- P&A activities (CM-26)
- Eni Source Control Response Plan (ENI-WOP-PL-001) (CM-22)
- Mutual Aid MoU for relief well drilling is in place which allows for expedited use of drilling rig for relief well drilling (CM-26)
- relevant well site personnel hold International Well Control Forum certificates (CM-24).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.6.6 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | P&A activities | The P&A planning is being expedited to eliminate the risk from WB4 as soon as reasonably practicable.<br>The P&A campaign is being expedited as per the schedule presented in Section 3.4.2, with allowance for constraints in vessel availability and weather etc.<br>P&A cannot feasibly occur before the dates set in Section 3.4.2. | ✓ |
| Substitute | No substitutes are available to eliminate the risk | N/A. | N/A |
| Engineering | Multiple barriers in place in the well (as per WOMP), reducing the likelihood of a release occurring | Reduces likelihood of loss of well control.<br>At least two isolation barriers are in place between the reservoir and the environment, reducing the likelihood of a release occurring. A release may occur in the unlikely event of simultaneous failure of all barriers and cannot be isolated further. | ✓ |
| Isolation | No substitutes are available to isolate the risk. P&A activity will eliminate the risk from WB4 | N/A. | N/A |
| Administrative | Satellite imagery will be processed every 14 days to detect surface slicks greater than 5 µm (equates to < 250 bbl leak releases) | Satellite monitoring is expected to detect leaks > 250 bbl per day. Upon detection Eni can investigate the source and respond to the leak.<br>Costs involved in contracting satellite monitoring are proportionate to the environmental benefit. | ✓ |
| | Contract satellite which can pick up spills < 250 bbl | The technology to detect surface slicks <5 µm is not readily commercially available.<br>Control is not feasible. | × |
| | Continuous visual watch/imagery of the WB4 WH (e.g. ROV) | Ensures that leaks are detected quickly. Adoption of the control would reduce the time a small leak continues undetected, thereby limiting the volume released to the environment.<br>The cost for 24-hour monitoring in field including vessel hire would be | × |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | | approximately $200,000/day, which is grossly disproportionate to the environmental benefit. | |
| | Scheduled designated monitoring flights for leak detection | Helicopter flights for leak monitoring over WB4 could potentially identify small leaks on the sea surface through oil sheen, initiating investigation into the leak source and ultimately reducing the duration of leak.<br>Eni already have satellite monitoring on the field which is determined to provide the same benefit at less cost and risk. | × |
| | Field Management | Field management will be conducted as per the schedule in Section 3.4.1 and rationale in Section 3.7.<br>Remedial measure will be applied as necessary to ensure that any anomalies identified are addressed.<br>Environmental benefit of field management on the schedule described in Section 3.4.1 is proportionate to the resources required to undertake it. | ✓ |
| | More frequent field management (e.g. not on a risk based approach). | Provides no additional benefit. Field Management is based on a risk based approach and assigns frequencies based on the risk levels. Additional field management may be applied if anomalies are identified/risk levels change or following risk events (e.g. cyclones).<br>Conducting field management when not required introduces additional risks (e.g. risks associated with vessel use, marine growth removal) and additional costs which grossly outweigh the environmental benefit. | × |
| | Accepted Well Operations Management Plan (WOMP) ensures that a number of well barriers are in place and verified | WOMP will ensure that a number of well barriers are in place and verified reducing the likelihood of a loss of containment event occurring.<br>Is a legislative requirement to have an approved WOMP in place under the OPGGS Act. | ✓ |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Eni Source Control Response Plan (ENI-WOP-PL-001) is in place and details steps to expedite the drilling of a relief well, including:<br>• relief well design<br>• simulation of the dynamic kill<br>• high-level requirement for the rig and the equipment, volumes and the pumping pressures. | Following the Source Control Response Plan in the event of a loss of well control will reduce the time taken control the well, limiting the volume released to the environment.<br>Minor costs involved in developing the plan and implementing. | ✓ |

### 8.6.7 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011: Accepted Well Operations Management Plan (WOMP).<br>Mutual aid MoU for relief well drilling is in place.<br>EPBC approval conditions (EPBC 2001/365) were considered for this risk. Condition number 3 relates to potential spills. The Woollybutt OPEP (000105_DV_PR.HSE.1045.000) is considered to meet this condition. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to a subsea release of Woollybutt crude. |

| Demonstration of Acceptability | |
|---|---|
| Area Sensitivity/ Biodiversity | See Section 8.6.4.<br>In the unlikely event of a subsea Woollybutt crude spill, the zone of potential impact may include open water and shorelines. Marine fauna may traverse open water impacted by a spill. Impacts to transient marine fauna within the vicinity of the spill include the potential to impact air breathing animals such as cetaceans, turtles and sea snakes due to of inhalation of vapours if they surface in the slick. Seabirds have also been identified as at risk if they contact surface hydrocarbons by oiling their feathers leading to loss of buoyancy and the potential for hypothermia.<br>Stranded hydrocarbons may accumulate on intertidal and shoreline habitats. This can reduce plant health leading to a reduction in habitat quality with secondary impacts to the fauna communities they support. However, the volumes potentially accumulated are small and the implementation of response strategies will reduce the volume and exposure time of habitats by Woollybutt crude, reducing potential impacts.<br>Habitat modification/degradation/disruption/loss, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). However, with controls in place the objectives of the Recovery Plans and Conservation Advice will be met. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

The subsea leak from field management activities is only credible from the WB4 well as it is the only shut-in production well with flow potential. Once this well is plugged and abandoned, the risk is no longer credible. The P&A campaign is being expedited as per the schedule presented in Section 3.4.2, with allowance for constraints in vessel availability, weather, etc. P&A cannot feasibly occur before the dates set in Section 3.4.2.

Field management (visual ROV surveys) application will monitor WB4 so it remains within acceptable integrity limits, reducing the likelihood of a leak event. Field management is applied based on the schedule presented in Section 3.4.1 and rationale presented in Section 3.7. Based on the leak risk it has been determined that ROV surveys, as presented in Section 3.4.2, are required. The findings from the field management campaigns may change the future frequencies of the field management activities if anomalies are identified/risk levels change.

Conducting field management when not required introduces additional risks (e.g. risks associated with vessel use, marine growth removal) and additional costs which grossly outweigh the environmental benefit.

Habitat modification/degradation/disruption/loss, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). The potential impacts of a hydrocarbon release are discussed in Table 8-8. Physical contact with hydrocarbons from a leak event to marine fauna is likely to have biological consequences; however,

it is unlikely to affect an entire population and not predicted to impact on the overall population viability.

The combination of satellite monitoring and visual ROV surveys present the best combination possible to detect a leak from WB4. Although more frequent inspection can reduce the likelihood of a spill continuing undetected, it presents new risks to personnel safety and emissions and discharges associated with making the additional trips and operating the ROV.

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk of a leak event was classified as medium, which is acceptable in accordance with Eni's acceptability criteria (Table 6-4). Given the rare likelihood of a release occurring with the controls that will be implemented, Eni considers that the risk of a leak event is acceptable and managed to ALARP.

## 8.7 Marine Diesel Spill to Sea (Risk ID 14)

### 8.7.1 Summary of Environmental Impact

**Bunkering Incident**

| Hazard | Marine Diesel Spill to Sea – Bunkering Incident | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | C | 2 | M |
| Residual Risk | B | 2 | L |

**Vessel Collision**

| Hazard | Marine Diesel Spill to Sea – Vessel Collision | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 3 | M |
| Residual Risk | A | 3 | L |

### 8.7.2 Description of Hazard

Marine diesel fuel will be used by all support vessels and IV/MODU. No intermediate or heavy fuel oil powered vessels will be used.

There are two causes of loss of marine diesel from the vessels during the Petroleum Activities Program:

- Refuelling/bunkering incident
- Collision with another vessel.

Given the proximity of the Chevron-operated Wheatstone pipeline to the Woollybutt field (Section 4.4.7), there is also potential for interaction with vessels conducting Wheatstone pipeline maintenance.

#### 8.7.2.1 Refuelling/bunkering incident

Refuelling/bunkering at sea is will occur during P&A and recovery of subsea equipment activities and may occur during field management (depending on the activity duration). Spills of marine diesel to sea surface during refuelling can be caused by a damaged refuelling hose, coupling failures, loss of connection, vessel collision or loss of vessel position. Spills resulting from overfilling will be contained within the vessel drains and slops tank system. In the event the refuelling pipe is ruptured, the fuel bunkering activity will cease by turning off the pump; the fuel remaining in the transfer line will escape to the environment as well as fuel that was released prior to the transfer operation being stopped. The guidance provided by AMSA (2013) for a refuelling spill under continuous supervision is considered appropriate given refuelling will be constantly supervised. The maximum credible spill volume during refuelling is calculated as transfer rate multiplied by 15 minutes of flow. The detection time of 15 minutes is seen as conservative but applicable following failure of multiple barriers followed by manual detection and isolation of the fuel supply. Based on an expected pumping rate

of 150 m³/hour and a conservative time of 15 minutes to shut down the pumping operation once the fuel spill had been identified, a total spill volume of approximately 37.5 m³ is proposed as the worst case credible volume for a refuelling incident.

#### 8.7.2.2 Collision with another vessel

A surface release of marine diesel from a vessel may result from an external impact (vessel collision) which ruptures a fuel tank. The largest tank for a support vessels (see Section 3.10.1) likely to be is approximately 30.4 m³ and the largest tank for an IV (see Section 3.10.2), used to conduct P&A and equipment recovery activities (see Section 3.7), is approximately 500 m³. AMSA (2015) defines the maximum credible spill volume as a result of a vessel collision to be the volume of the largest fuel tank. Therefore the maximum release in the event of a vessel collision is 500 $m^3$ of marine diesel.

It is not credible that the total storage volume of a vessel would be lost, as fuel is stored in multiple tanks.

For the purpose of a hydrocarbon spill risk assessment from vessel collision, Eni determined that 500 $m^3$ release would cover all credible vessel spill scenarios. This is on the basis that the optimal fuel operating capacity is generally at 80% of tank capacity to prevent loss of fuel from vents in rough seas and vessels will not always carry maximum fuel during activities.

MODU fuel tank loss from a collision with a third party or support vessel is not considered credible, as the tanks are located above sea level. The draught of vessel and location of tanks in terms of water line prevent the tanks from being breached.

#### 8.7.2.3 Wheatstone pipeline maintenance vessel interaction

The Wheatstone pipeline lies within WA-25-L, approximately 1.5 km and 1.3 km to the west of the WB-4 and WB-5A well locations, respectively (Section 4.4.7). In the event that there are Wheatstone pipeline maintenance activities occurring at the same time as Woollybutt offshore activities, particularly P&A at WB-4 and WB-5A, there is potential for vessel interaction and collision resulting in release of MDO. Scheduling conflicts can be managed via consultation and planning. Eni will consult with the Wheatstone pipeline operator to ensure that P&A activities and any pipeline maintenance activities will be spatially and temporally separated. SIMOPs are therefore not anticipated with non-project vessels.

#### 8.7.2.4 Diesel Characteristics and Weathering

Marine diesel is a light, refined petroleum product with a relatively narrow boiling range. When spilled on water, most of the oil will evaporate or naturally disperse within a few days or less. Marine diesel fuel properties (including the components) are summarised in Figure 8-17.

**Table 8-13: Marine diesel fuel properties**

| Oil Type | Volatiles (%) | Semi-Volatiles (%) | Low Volatiles (%) | Residual (%) | Aromatics (%) |
|---|---|---|---|---|---|
| Boiling point (°C) | < 180<br>C4 to C10 | 180-265 C11 to C15 | 265-380<br>C16 to C20 | > 380<br>> C20 | Of whole oil<br>< 380 BP |
| | Non-persistent | | | Persistent | |
| Marine Diesel | 6 | 34.6 | 54.4 | 5 | 3 |

APASA (2021) conducted weathering simulations to illustrate the potential behaviour of marine diesel when exposed at the water's surface. The results are detailed below:

- The mass balance forecast for the constant-wind case (Figure 8-17) for marine diesel shows that approximately 41% of the oil is predicted to evaporate within 24 hours. Under these calm conditions the majority of the remaining oil on the water surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation of the residual compounds will slow significantly, and they will then be subject to more gradual decay through biological and photochemical processes.
- Under the variable-wind case (Figure 8-17) where the winds are of greater strength, entrainment of marine diesel into the water column is indicated to be significant. Approximately 24 hours after the spill, around 72% of the oil mass is forecast to have entrained and a further 24% is forecast to have evaporated, leaving only a small proportion of the oil floating on the water surface (<1%). The residual compounds will tend to remain entrained beneath the surface under conditions that generate wind waves (approximately >6 m/s).

The increased level of entrainment in the variable-wind case will result in a higher percentage of biological and photochemical degradation, where the decay of the floating slicks and oil droplets in the water column occurs at an approximate rate of 2.4% per day. Given the large proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons will decay and/or evaporate over time scales of several weeks to a few months.

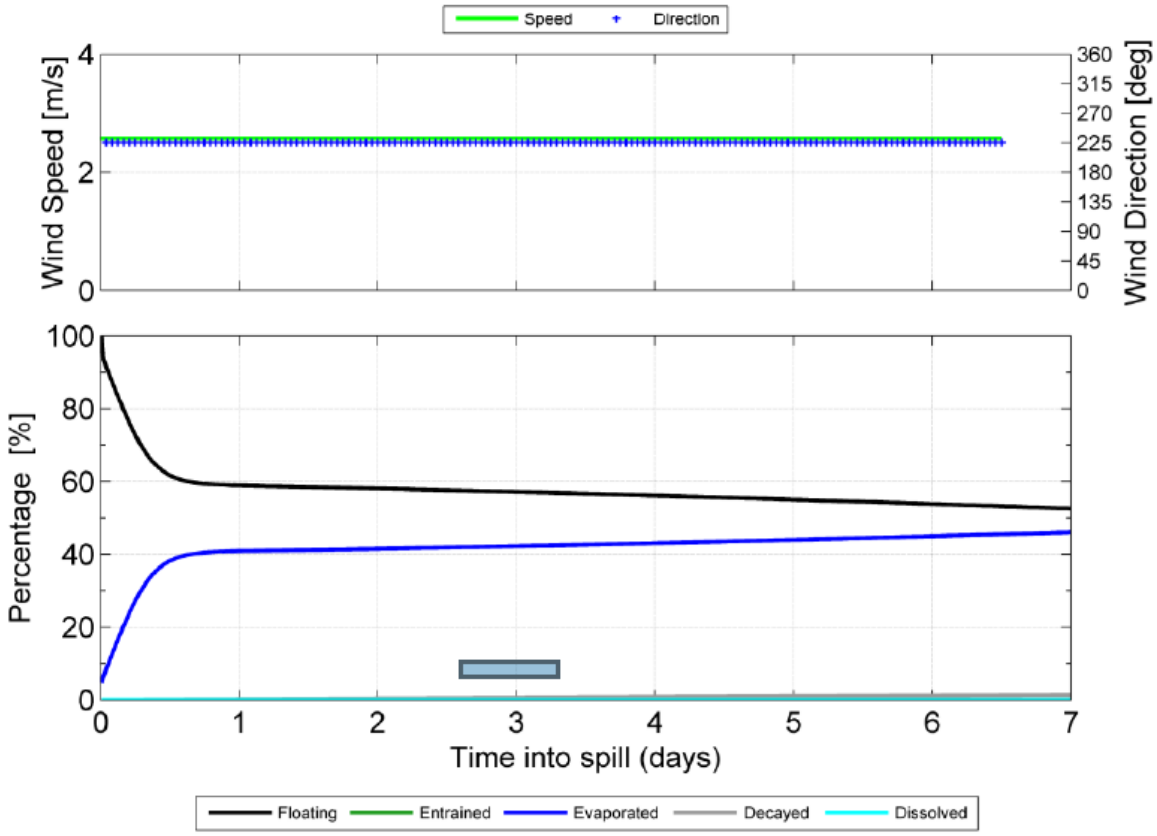



**Figure 8-17: Proportional mass balance plot representing the weathering of marine diesel spilled onto the water surface as a one-off release (50 m³) and subject to a constant 5 kn (2.6 m/s) wind at 27 °C water temperature and 25 °C air temperature.**

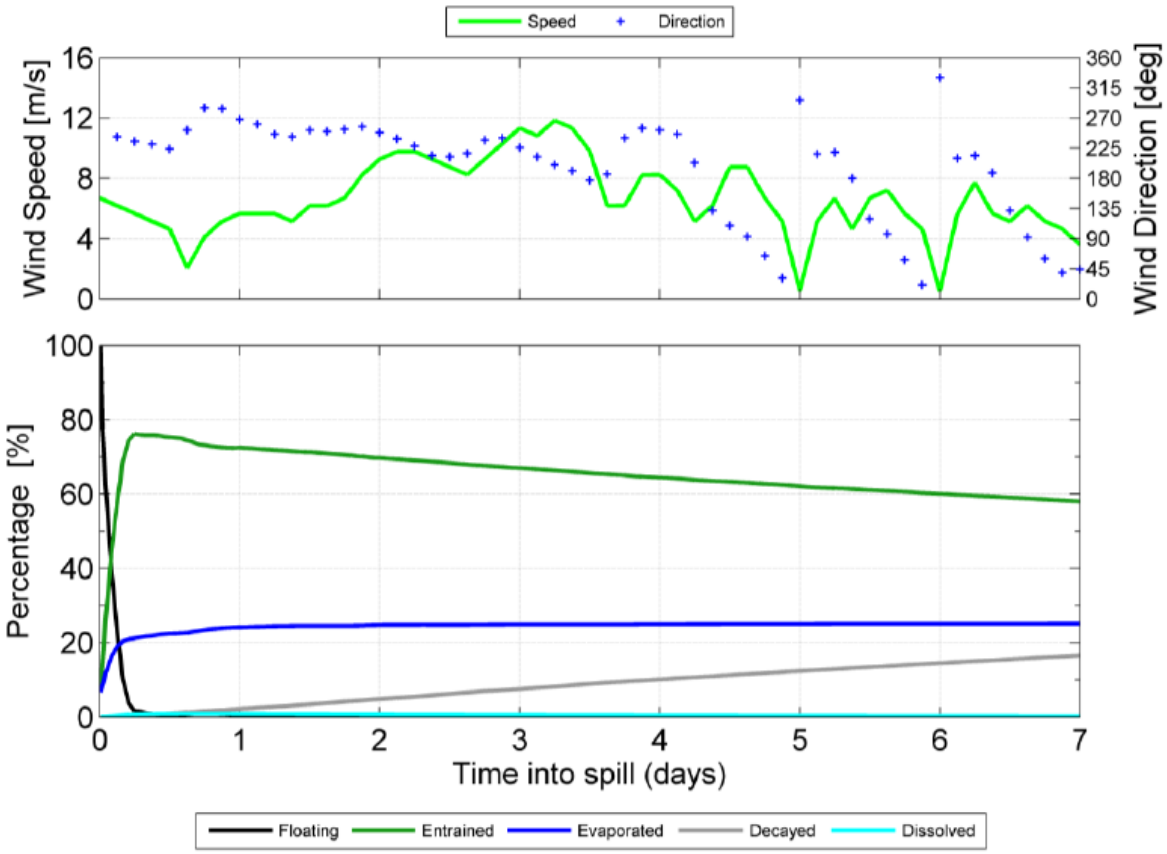



**Figure 8-18: Proportional mass balance plot representing the weathering of marine diesel spilled onto the water surface as a one-off release (50 m³) and subject to variable wind at 27 °C water temperature and 25 °C air temperature.**

### 8.7.3 Diesel Spill Modelling

A 500 m³ marine diesel release was modelled by APASA (2021) at the Woollybutt-5 well (closest well to the coastline) for summer, winter and transitional seasons and is considered appropriate, although conservative, for informing the approximate spatial extent of potential impacts from a vessel collision event during the Petroleum Activities Program.

Table 8-14 presents the parameters and justification used in the modelling.

**Table 8-14: Summary of parameter and justifications for marine diesel spill modelling from the Woollybutt-5 well**

| Parameter | Description |
|---|---|
| Number of spill simulations | 100 |
| Hydrocarbon type | Marine diesel |
| Release type | Surface release |
| Total spill volume | 500 $m^3$ |
| Spill volume justification | Largest tank of an IV vessel (refer Section 3.10.2) |
| Release duration | Instantaneous |

#### 8.7.3.1 Surface and Shoreline Hydrocarbons

The predicted seasonal probability contour figures (Figure 8-19 to Figure 8-21) indicate that, in a worst case scenario, floating oil concentrations at or greater 1 $g/m^2$ could travel up to 48 km from the release location (in the summer season).

Shoreline accumulation is predicted at Cape Range after 428 hours, with a worst-case accumulated concentration of 25 $g/m^2$ and volume of 2 $m^3$. No other shoreline receptors are predicted to be contacted by hydrocarbons.

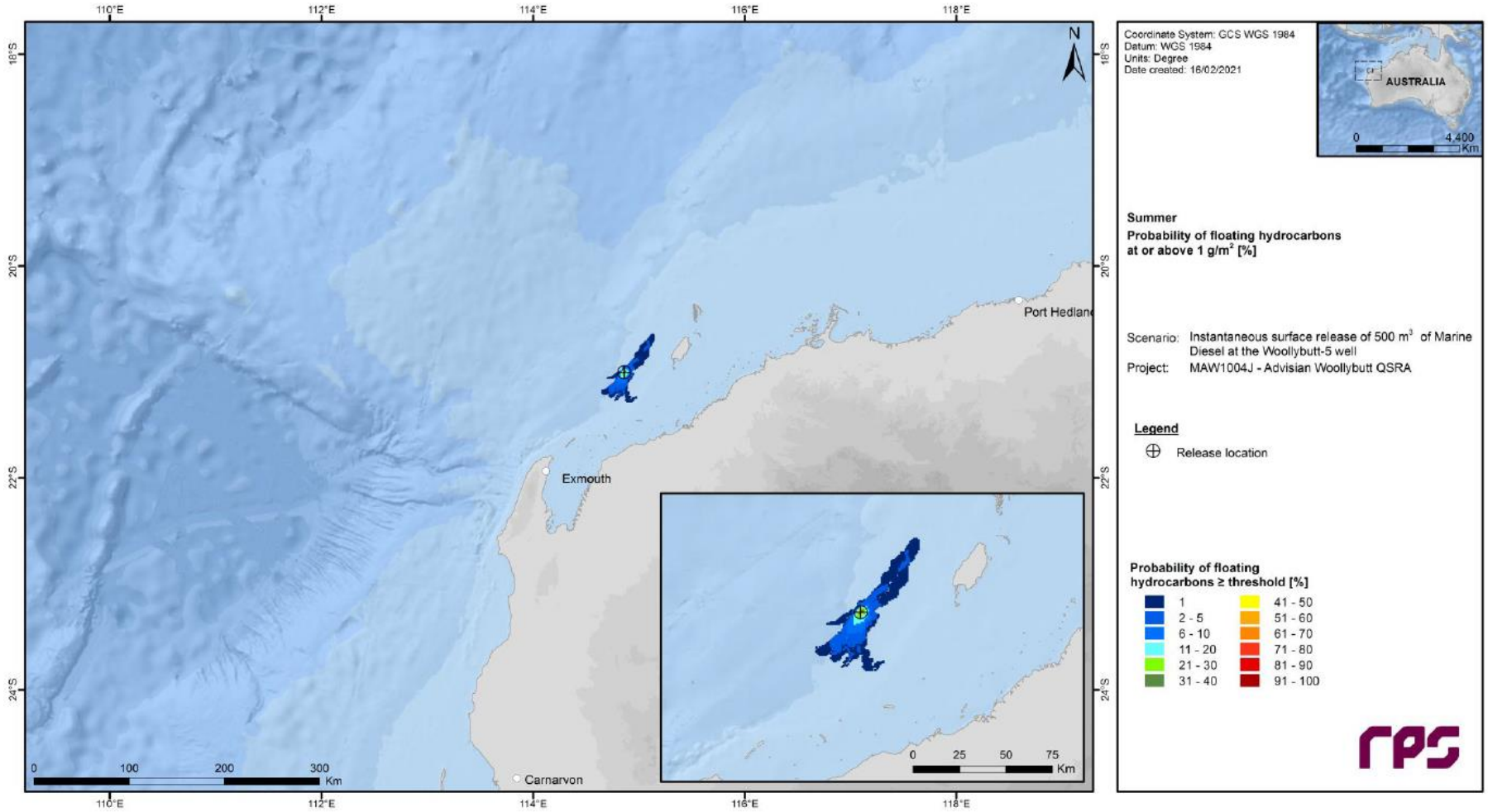



**Figure 8-19: Predicted probability of floating oil concentrations at or above 1 g/m² resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during summer (APASA, 2021)**

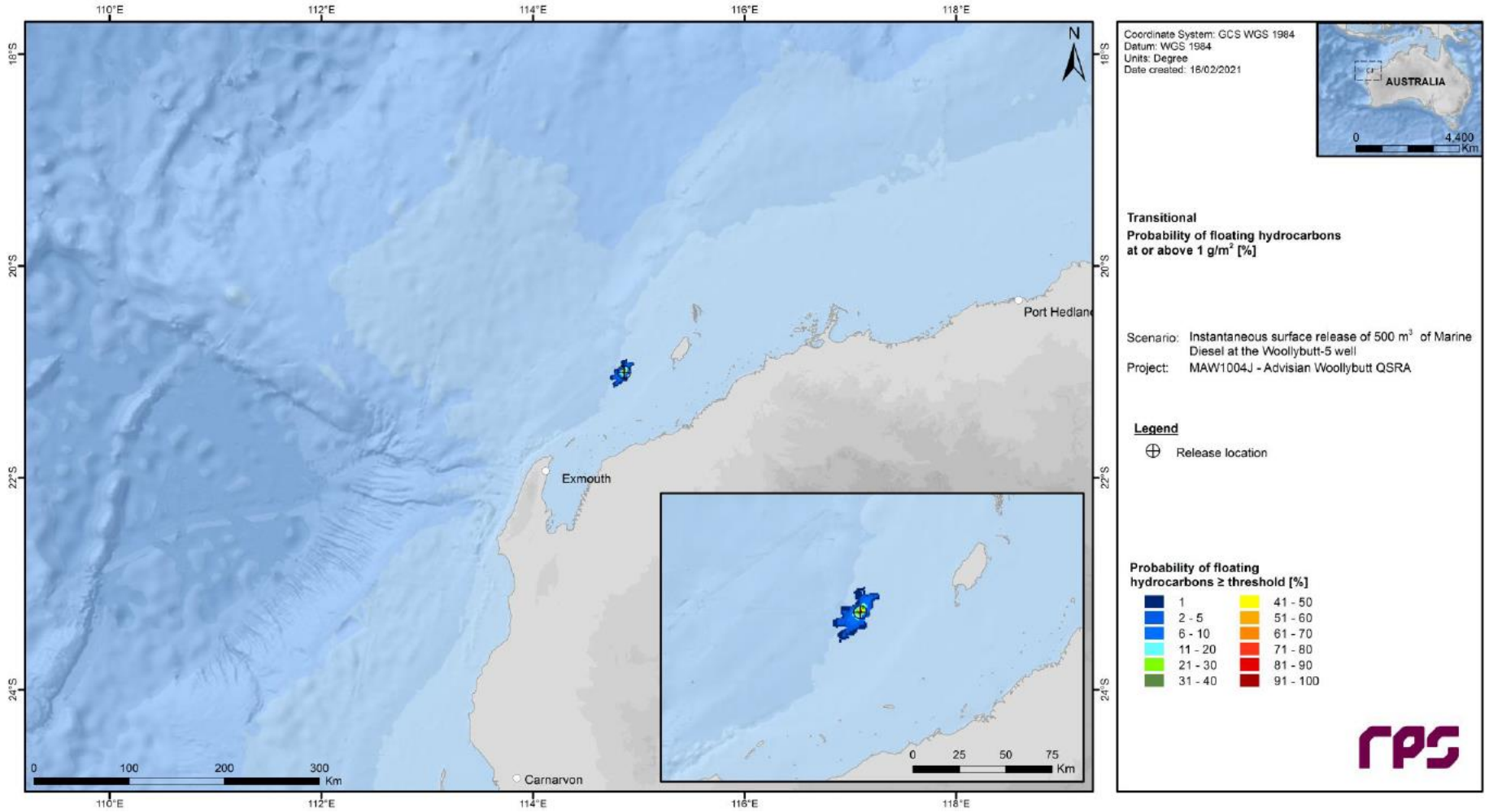



**Figure 8-20: Predicted probability of floating oil concentrations at or above 1 g/m² resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during transitional months (APASA, 2021)**

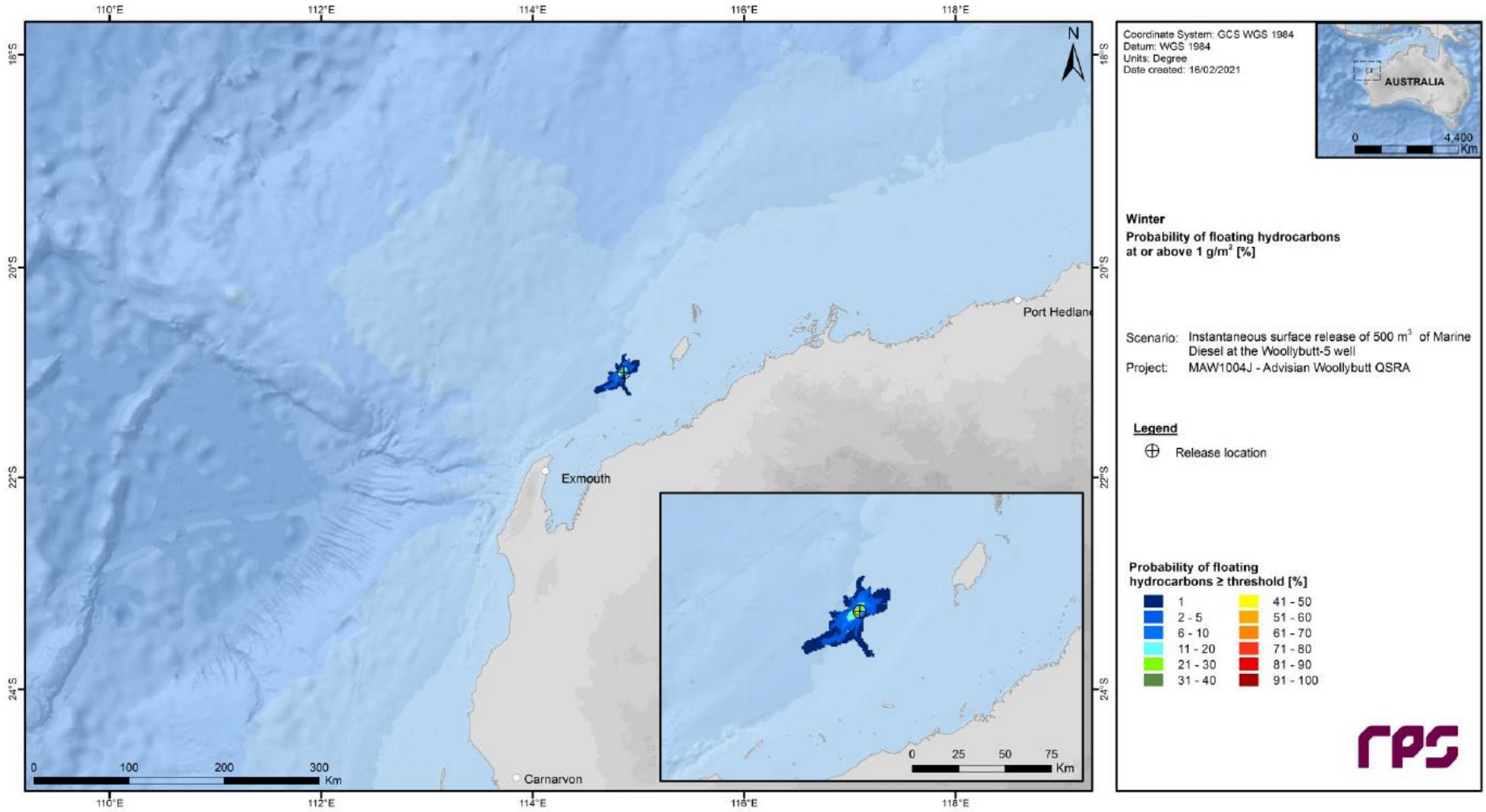



**Figure 8-21: Predicted probability of floating oil concentrations at or above 1 g/m² resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during winter (APASA, 2021)**

#### 8.7.3.2 Subsurface -Entrained Hydrocarbons

The seasonal probability contour figures (**Figure 8-22** to **Figure 8-24**) indicate entrained oil concentrations at or greater than 100 ppb could travel up to 481 km from the release location (in summer).

Probability of contact by entrained oil concentrations are predicted to be greatest in the winter season at the Ancient Coastline at 125m Depth Contour KEF (Table 8-15).

**Table 8-15: Expected entrained oil outcomes at sensitive receptors resulting from a from an instantaneous surface release of marine diesel (APASA, 2021)**

| Receptor | Probability (%) of entrained hydrocarbon concentration contact at ≥ 100 ppb | | | Minimum time to receptor waters (hours) at ≥ 100 ppb | | | Maximum entrained hydrocarbon concentration (ppb) (worst case replicate) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Summer | Winter | Transitional | Summer | Winter | Transitional | Summer | Winter | Transitional |
| Gascoyne AMP | 8 | 14 | 9 | 81 | 90 | 93 | 1587 | 1072 | 759 |
| Montebello AMP | 8 | 1 | 5 | 98 | 139 | 94 | 1033 | 345 | 1139 |
| Ningaloo AMP | 9 | 19 | 4 | 81 | 86 | 100 | 1583 | 1773 | 1034 |
| Exmouth coastline | 4 | 5 | 1 | 119 | 165 | 244 | 651 | 345 | 440 |
| Muiron Islands | 1 | 8 | - | 230 | 84 | - | 130 | 380 | - |
| Montebello Islands | 1 | - | 1 | 190 | - | 215 | 156 | - | 153 |
| Thevenard Island | - | 1 | - | - | 267 | - | - | 223 | - |
| Barrow Island | - | - | 1 | | | 174 | | | 79 |
| Ningaloo Coast WH | 9 | 19 | 4 | 81 | 86 | 100 | 1583 | 1773 | 1034 |
| Ningaloo MP (State) | 7 | 8 | 2 | 95 | 104 | 163 | 1040 | 640 | 624 |
| Muiron Islands MP | 2 | 8 | - | 151 | 84 | - | 354 | 380 | - |
| Cape Range National Park | 4 | 5 | 1 | 119 | 199 | 257 | 651 | 331 | 324 |
| Ancient Coastline at 125m Depth Contour KEF | 41 | 47 | 44 | 7 | 5 | 8 | 756 | 976 | 9300 |
| Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF | 12 | 33 | 13 | 46 | 43 | 62 | 62 | 43 | 3328 |
| Commonwealth waters adjacent to Ningaloo Reef KEF | 9 | 19 | 4 | 81 | 86 | 100 | 54 | 19 | 1773 |
| Continental Slope Demersal Fish Communities | 22 | 22 | 21 | 29 | 36 | 27 | 119 | 122 | 1470 |
| Exmouth Plateau | 3 | 1 | 3 | 186 | 288 | 253 | 6 | 7 | 192 |

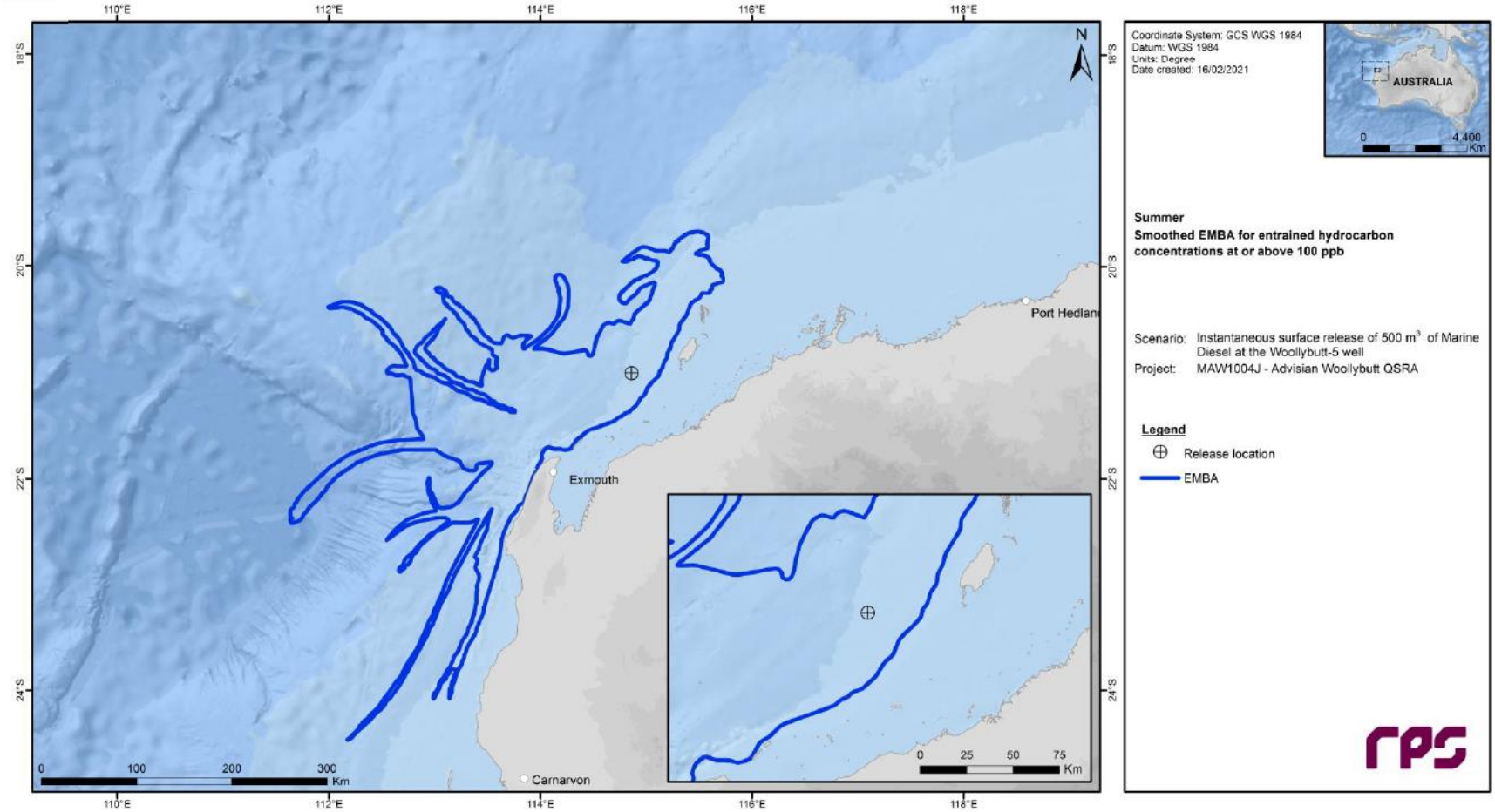



**Figure 8-22: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during summer (APASA, 2021)**

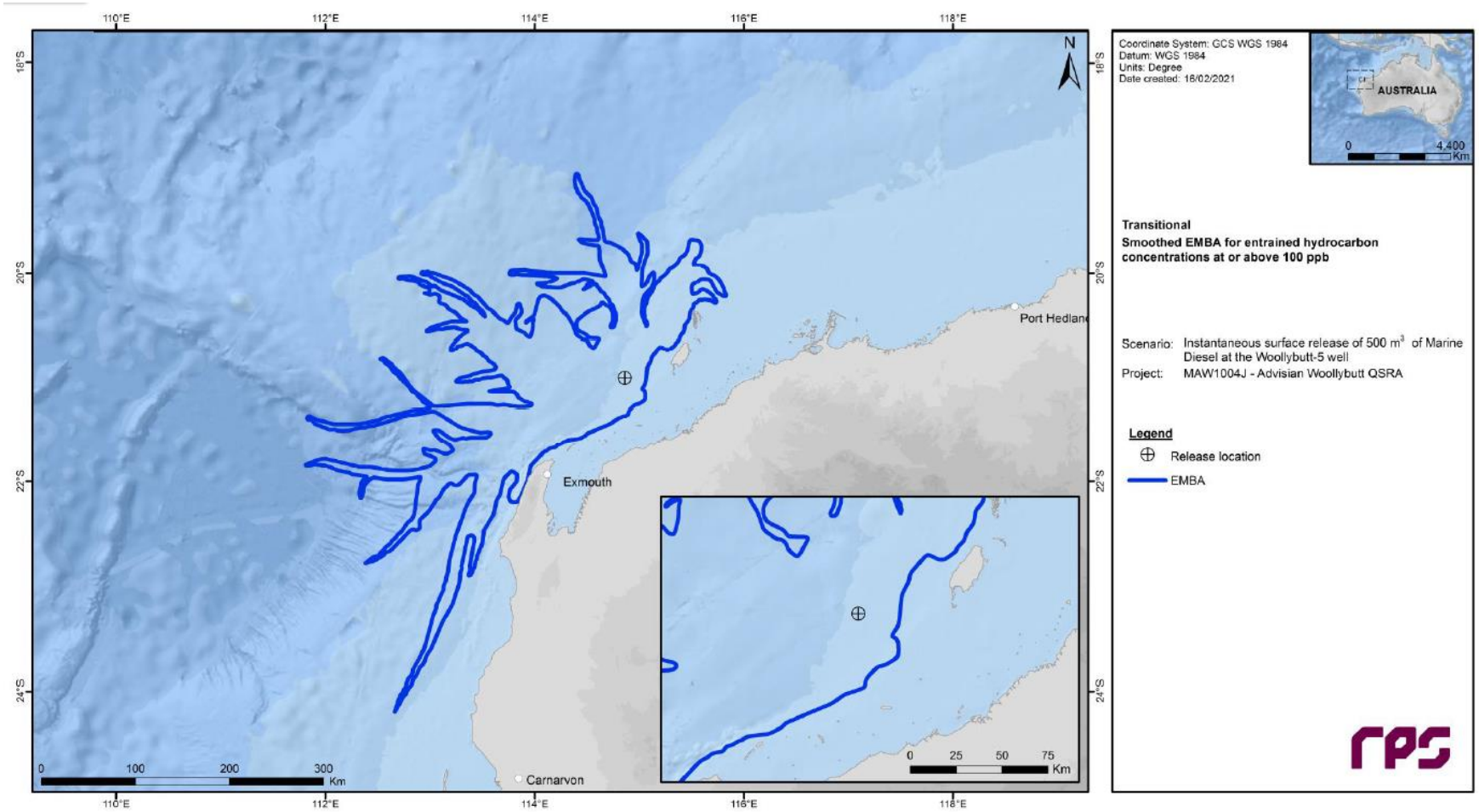



**Figure 8-23: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during transitional months (APASA, 2021)**

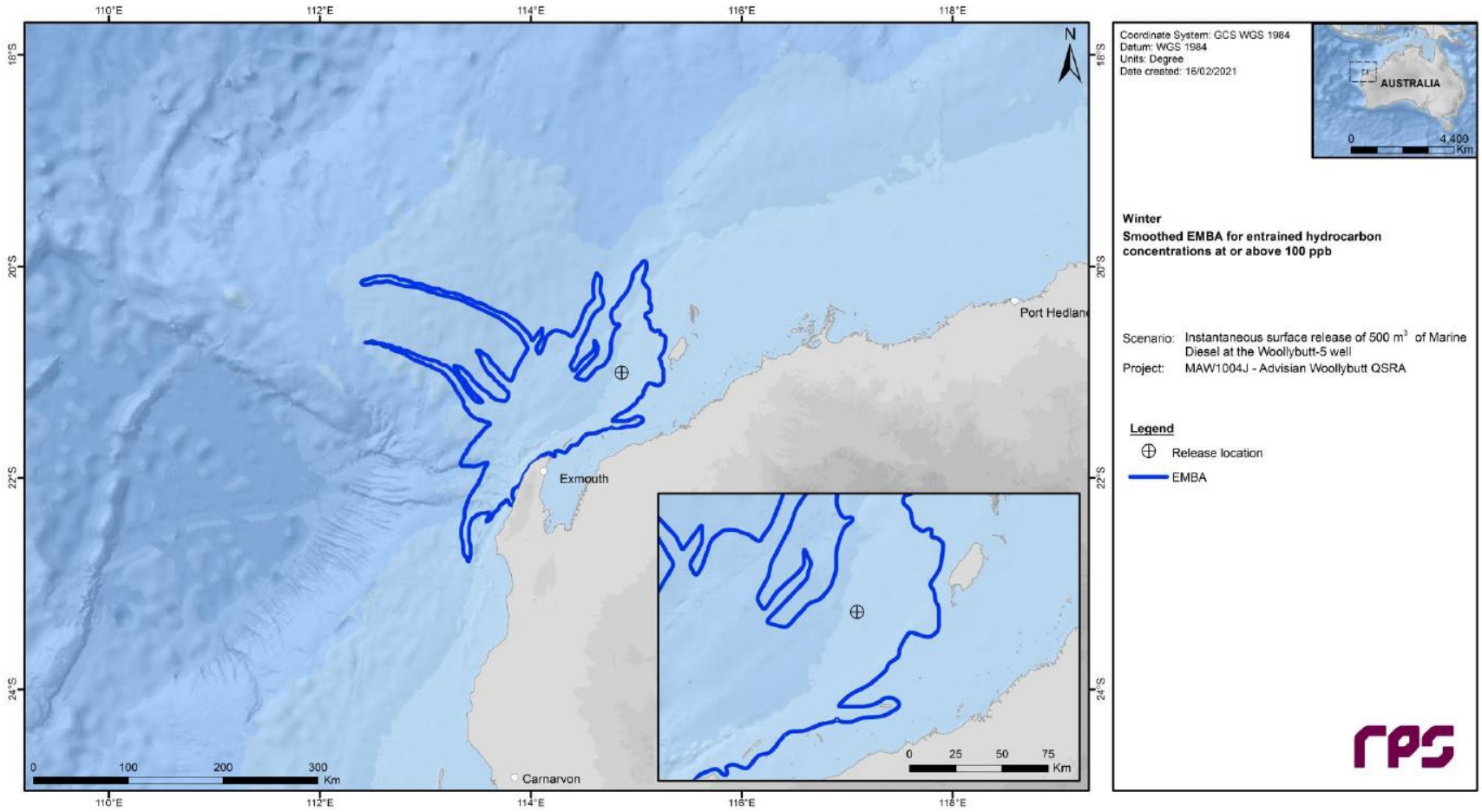



**Figure 8-24: Predicted ZPI of entrained oil concentrations at or above 100 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during winter (APASA, 2021)**

#### 8.7.3.3 Subsurface -Dissolved Aromatics

The seasonal probability contour figures (**Figure 8-25** to **Figure 8-27**) indicate that dissolved aromatic hydrocarbon concentrations at or greater than 6 ppb could travel up to 421 km from the release location in summer.

The worst-case instantaneous dissolved aromatic hydrocarbon concentration at any receptor is predicted at Ancient Coastline at 125m Depth Contour KEF (Table 8-16).

**Table 8-16: Expected dissolved oil outcomes at sensitive receptors resulting from a from an instantaneous surface release of marine diesel (APASA, 2021)**

| Receptor | Probability (%) of entrained hydrocarbon concentration contact at ≥ 6 ppb | | | Maximum dissolved hydrocarbon concentration (ppb) (worst case replicate) | | |
|---|---|---|---|---|---|---|
| | Summer | Winter | Transitional | Summer | Winter | Transitional |
| Gascoyne AMP | 5 | 8 | 5 | 54 | 35 | 30 |
| Montebello AMP | 3 | 1 | 2 | 36 | 9 | 43 |
| Ningaloo AMP | 7 | 9 | 2 | 67 | 60 | 37 |
| Exmouth coastline | 2 | 2 | 1 | 16 | 15 | 10 |
| Muiron Islands | 1 | 2 | - | 8 | 20 | - |
| Ningaloo Coast WH | 7 | 9 | 2 | 67 | 60 | 37 |
| Ningaloo MP (State) | 3 | 5 | 1 | 63 | 40 | 20 |
| Muiron Islands MP | - | 3 | - | - | 50 | - |
| Cape Range National Park | 1 | 2 | 1 | 9 | 7 | 10 |
| Ancient Coastline at 125m Depth Contour KEF | 24 | 26 | 29 | 174 | 210 | 193 |
| Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF | 8 | 19 | 8 | 96 | 90 | 51 |
| Commonwealth waters adjacent to Ningaloo Reef KEF | 7 | 9 | 2 | 67 | 60 | 37 |
| Continental Slope Demersal Fish Communities | 11 | 8 | 11 | 118 | 84 | 135 |
| Exmouth Plateau | 1 | - | 1 | 17 | - | 9 |

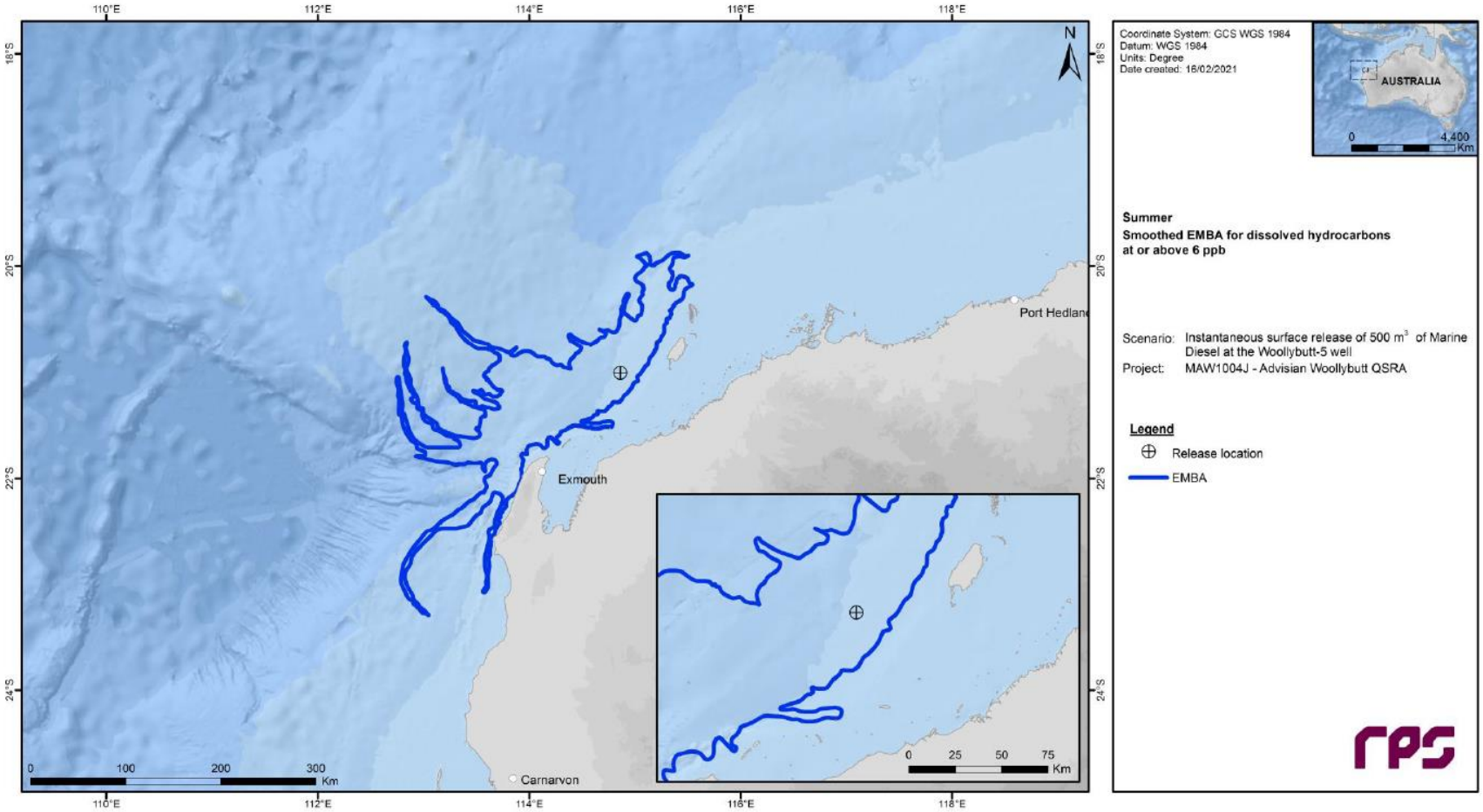



**Figure 8-25: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during summer (APASA, 2021)**

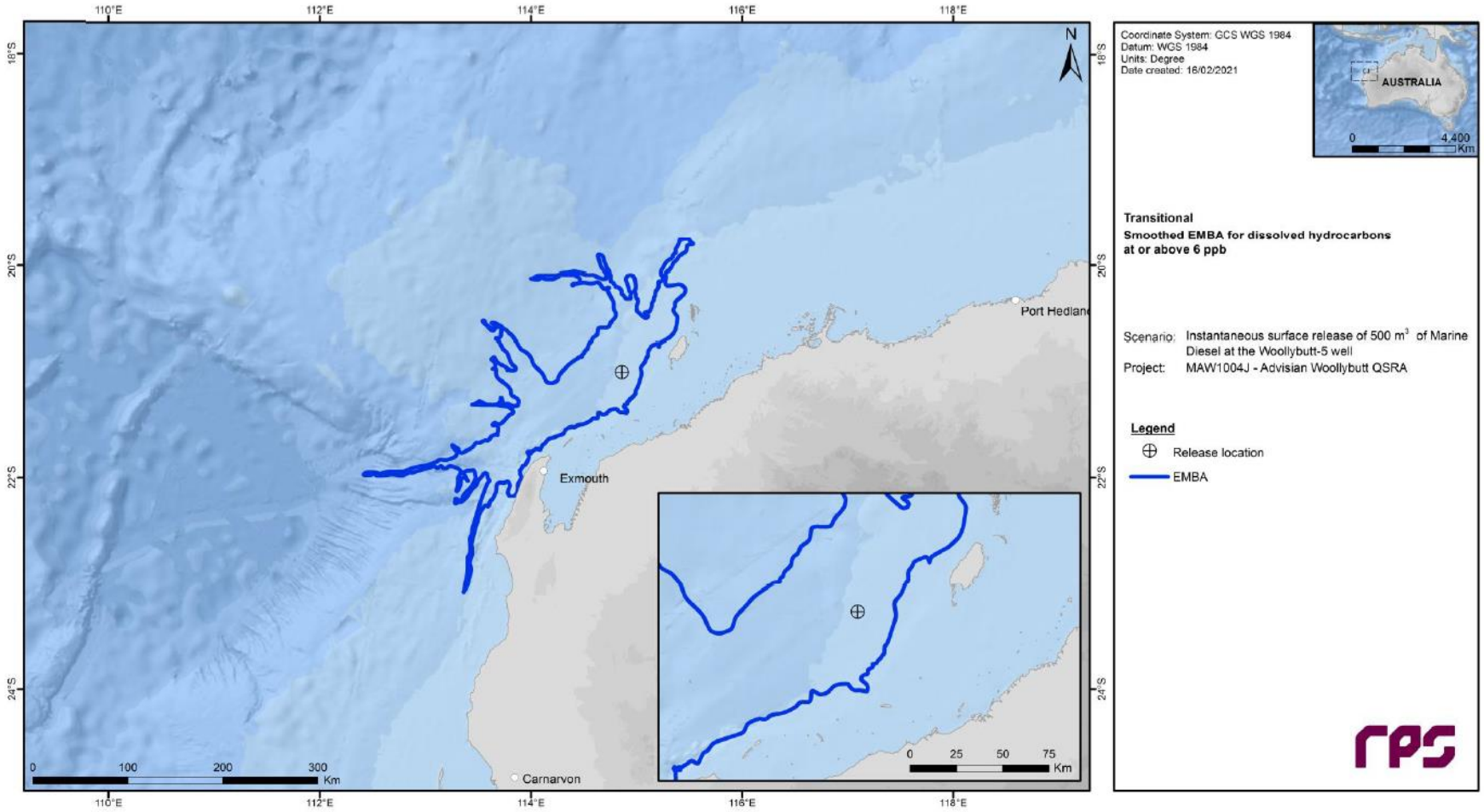



**Figure 8-26: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during transitional months (APASA, 2021)**

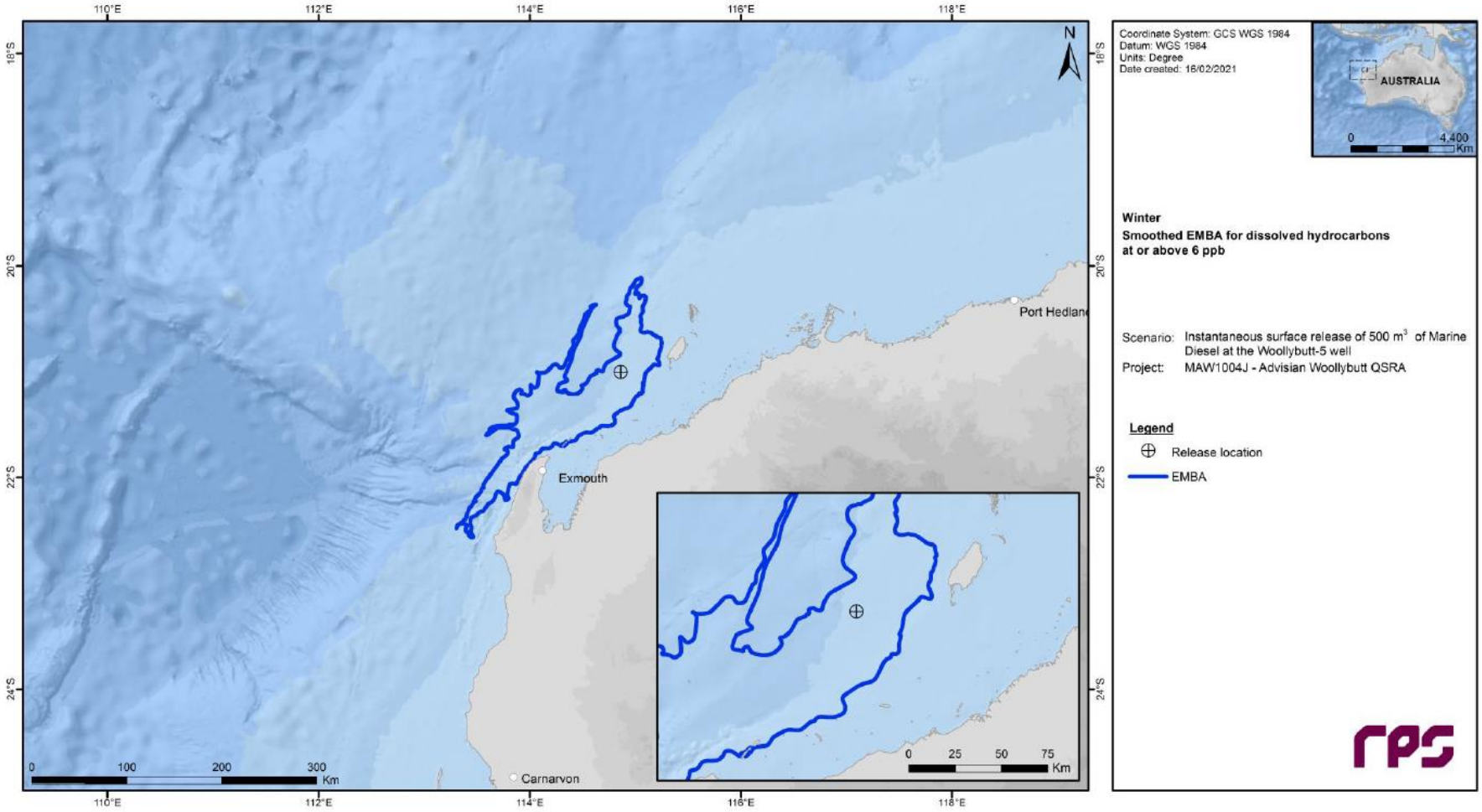



**Figure 8-27: Predicted ZPI of dissolved aromatic hydrocarbon concentrations at or above 6 ppb resulting from an instantaneous surface release of marine diesel at the Woollybutt-5 well, starting during winter (APASA, 2021)**

#### 8.7.3.4 Potential Environmental Impact

The potential impacts of hydrocarbon releases (Woollybutt crude and marine diesel) are described in Table 8-8.

A surface release of 500 m³ diesel has the potential to contact the Gascoyne, Montebello, Shark Bay and Ningaloo AMPs. Impacts to the value of the AMPs within the ZPI have been discussed in Section 8.5.4.

### 8.7.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no loss of containment of hydrocarbons to the marine environment (EPO-13).

Control Measures relating to this risk include:

- bulk refuelling transfer procedures (CM-27)
- vessel spill response plan (SOPEP) (CM-28)
- on board spill response kits (CM-29)
- navigation equipment and procedures (CM-1)
- petroleum safety zone (CM-3)
- adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised (CM – 37)
- consultation with the Wheatstone pipeline operator during planning and operations (CM – 38)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.7.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate vessel use | The potential for vessel collision leading to diesel spill is highly unlikely but the likelihood cannot be completely eliminated, as the vessels are necessary to undertake the Petroleum Activities Program. | × |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/management** | **Evaluation** | **Adoption?** |
| | Eliminate bunkering activities during P&A and equipment recovery | Would remove the spill risk from bunkering. However, the duration of the P&A program and equipment recovery requires that bunkering of fuel occur, so the activity can be completed. Refuelling at sea may be necessary and is preferable (less risk, reduces time) to steaming back to port to refuel. | × |
| | Eliminate bunkering activities during field management | It is possible the field management activities are of a duration that bunkering is not required and effort is made to accommodate this. However, in the event that field management activities are extended, bunkering at sea will be required. It is therefore not feasible to eliminate bunkering during field management. | × |
| Substitute | Zero fuel bunkering via hose | Removes spill risk from hose operations. Drums could be used, however, presents cost associated with multiple vessel transits and Health and Safety issues during transfer of drums. | × |
| | Use of marine diesel rather than Heavy Fuel Oil (HFO) on vessels and IV | Marine diesel is lighter than HFO and will evaporate faster and persist less in the marine environment. Marine diesel is already used on the vessels and IV in accordance with Marine Orders. | ✓ |
| Engineering | Navigation equipment | Vessels will be compliant with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) 2009. Negligible costs of operating navigational equipment. | ✓ |
| | Contract double hulled vessels only | Vessels are subject to availability and are required to meet Eni standards. double hull requirement would be of high cost and subject to vessel availability which could cause project delay. | × |
| Isolation | N/A | N/A. | N/A |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/management** | **Evaluation** | **Adoption?** |
| Administrative | Compliance with administrative control measures, such as:<br>• marine notices<br>• contractor bunkering procedures. | Administrative control can reduce potential for collision and bunkering spills with minimal cost involved. | ✓ |
| | Petroleum safety zone | No additional costs. Other marine users may be temporarily excluded from areas. A PSZ is already present around the subsea wells and DSPM. | ✓ |
| | Vessel spill response plan (SOPEP) | Environmental benefit outweighs minor costs in implementing and testing the vessel spill response plan (SOPEP), which contains plans to prevent spills reaching the marine environment.<br>The SOPEP is a requirement under MARPOL Annex 1 requirements (all vessels larger than 400 gross tonnage have Shipboard Oil Pollution Emergency Plan (SOPEP) or Shipboard Marine Pollution Emergency Plans (SMPEP) outlining options to control the source of a hydrocarbon spill). | ✓ |
| | Adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised | Adhering to the Wheatstone pipeline exclusion zone will ensure that planned MODU mooring operations will not interact with the Wheatstone pipeline.<br>Where this is not possible, Eni will seek permission from the pipeline operator to enter the exclusion zone. | ✓ |
| | Consultation with the Wheatstone pipeline operator during planning and operations | Consultation with the Wheatstone pipeline operator will ensure that WB4 and WB5A well P&A and any pipeline maintenance activities will be spatially and temporally separated.<br>Consultation will also be undertaken in relation to emergency arrangements. | ✓ |

### 8.7.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Vessels compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions)<br>Vessels compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 21 (Safety of navigation and emergency procedures)<br>Vessels comply with MARPOL 73/78 Annex I<br>EPBC approval conditions (EPBC 2001/365) were considered for this risk. Condition number 3 relates to potential spills. The Woollybutt OPEP (000105_DV_PR.HSE.1045.000) is considered to meet this condition.<br>Adherence to the Wheatstone pipeline exclusion zone. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to the potential risk of a marine diesel spill to sea.<br>Eni will consult with the Wheatstone pipeline operator during planning and operations to ensure any work programs can be managed simultaneously. |
| Area Sensitivity/ Biodiversity | See Section 8.7.3.<br>In the unlikely event of a 100 m³ marine diesel spill, the zone of potential impact contains only open waters where transient fauna may traverse no impacts to marine habitats are predicted. Impacts to transient marine fauna within the vicinity of the spill include the potential to impact air breathing animals such as cetaceans, turtles and sea snakes due to of inhalation of vapours if they surface in the diesel slick. Seabirds have also been identified as at risk if they contact the diesel slick by oiling their feathers leading to loss of buoyancy and the potential for hypothermia. However, the rapid rates of evaporation will limit exposure to transient animals and limit the extent of potential impacts.<br>Habitat modification/degradation/disruption/loss, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). However, with controls in place the objectives of the plans/advice will be met. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

The activity could not be completed without the use of support vessels or IV and therefore, elimination of vessel use is not a feasible option. Refuelling at sea may be necessary and is preferable to steaming back to port to refuel. Returning to port for refuelling would extend the duration of the activities, increasing the potential for other risks to occur, in addition to adding unnecessary costs to the project. Therefore, elimination or substitution of refuelling at sea was not considered practicable. The residual risk of a marine diesel spill as a result of a vessel collision during P&A activities is low as the duration of the activity is relatively short (see Section 3.4). This is acceptable in accordance with Eni's acceptability criteria (Table 6-3).

A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk of a marine diesel spill as a result of a refuelling accident was also classified as low, which is acceptable in accordance with Eni's acceptability criteria (Table 6-3).

Given the relatively short duration of the Petroleum Activities Program (see Section 3.4), the rare likelihood with the controls that will be implemented, Eni considers that the risk of a marine diesel spill is acceptable and managed to ALARP.

## 8.8 Minor Hydrocarbon or Chemical Leaks (Risk ID 15)

### 8.8.1 Summary of Environmental Impact

**Leak from ROV, fixtures and fittings**

| Hazard | Leak from fittings and connections | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 2 | L |
| Residual Risk | B | 1 | L |

### 8.8.2 Description of Hazard

#### 8.8.2.1 Hydraulic Fluid Leak from ROV, Fixtures and Fittings

The types of fluids stored on the IV/MODU and support vessels range from lubricating fluids to hydraulic fluids, which are used in fittings and connections. Leaks could occur due to a failure of a mechanical component. Outside vessels, the largest credible spill would be a release of < 1 m³ of stern tube oil (non-hydrocarbon-based lube oil) from a vessel thruster/propeller stern tube.

Accidental release of hydraulic fluids volumes from ROV failure are expected to be low (around 20 L) and may occasionally occur from operation of the ROV, if hydraulic lines are pinched during subsea work.

### 8.8.3 Potential Environmental Impact

The hydraulic fluid typically used during vessel operations is a water-based hydraulic fluid, Oceanic HW443. Oceanic HW443 is reported to have a low toxicity to the marine environment and has been classified under the Offshore Chemical Notification Scheme (OCNS) as Class D, which represents a low toxicity (CEFAS, 2016). It has been used widely in marine environments worldwide with no observed environmental effect (MacDermid, 2007).

The release of hydraulic fluid has the potential to result in a localised temporary reduction in water quality. Hydraulic oils behave similarly to marine diesel when spilt to the marine environment. These are medium oils of light to moderate viscosity. They have a relatively rapid spreading rate and will dissipate quickly in ocean conditions. Similar to diesel, the spill will have a tendency to sit on the surface during calm conditions and will readily entrain during variable winds between 4-19 knots; readily returning to the surface when conditions return to calm.

### 8.8.4 Environmental Performance Outcomes and Control Measures

The following mitigation measures have been identified to reduce the potential of leaks.

Environmental Performance Outcomes (EPOs) relating to this risk include:

- no significant leaks to the marine environment from fittings and connections (EPO-18)

- no loss of containment of hydrocarbons to the marine environment (EPO-13).

Control Measures relating to this risk include:

- vessel spill response plan (SOPEP) (CM-28)
- on board spill response kits (CM-29)
- oily water prevention (CM-10)
- ROV equipment maintenance (CM-30)
- pre-dive ROV checks (CM-31).

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.8.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Eliminate hydraulic systems and ROVs | Would eliminate the environmental risk associated with hydraulic fluids.<br>The requirement for hydraulic systems and their hoses and connections cannot be eliminated and are required for operations. | × |
| Substitute | N/A | N/A. | N/A |
| Engineering | Vessels and IV/MODU are equipped with Oily water prevention system and IMO approved oil filtering equipment | Bunding of high risk areas on (e.g. machinery) and subsequent drainage to an IMO approved oil filtering equipment will ensure that discharge is complaint with Marine Order 91. Minor costs involved to implement as vessels and IV/MODU will be required to comply with Marine Order 91. | ✓ (through compliance with Marine Order 91) |
| Isolation | N/A | N/A. | N/A |
| Administrative | Compliance with administrative aspects of Marine Order 91 requirements | Environmental benefit outweighs minor costs in implementing and complying to Marine Order 91 requirements. | ✓ (through compliance with Marine Order 91) |
| | Placement of spill kits in high spill risk areas of IV/MODU and vessel decks | Environmental benefit outweighs minor costs in implementing and locating spill response kits in proximity to hydrocarbon storage/bunkering areas. | ✓ |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Vessel SOPEP, which contains plans to prevent spills reaching the marine environment | Environmental benefit outweighs minor costs in implementing and testing the vessel spill response plan (SOPEP), which contains plans to prevent spills reaching the marine environment.<br>The SOPEP is a requirement under MARPOL Annex 1 requirements, (all vessels over 400 gross tonnage have Shipboard Oil Pollution Emergency Plan (SOPEP) or Shipboard Marine Pollution Emergency Plans (SMPEP) outlining options to control the source of a hydrocarbon spill). | ✓ |

### 8.8.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | Compliance with MARPOL 73/78 Annex I, as applied in Australia under the *Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Part II Prevention of pollution by oil); and Marine Order 91 (Marine pollution prevention – oil).<br>The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to unplanned hydraulic fluid leak/chemical releases. |
| Area Sensitivity/ Biodiversity | A hydraulic fluid leak/chemical release has the potential to cause a localised temporary reduction in water quality. Given the low predicted release volume, the low toxicity and rapid dilution in the marine environment, toxicity impacts to marine fauna are highly unlikely.<br>Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (Table 4-3). However, with controls in place the objectives of the plans/advice will be met. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

Hydraulic fluid is necessary to ensure safe and efficient operation of machinery, its use cannot be eliminated and there is no feasible substitution. No alternatives to the use of ROVs on support vessels have been identified to check the condition of well valves and HXT to prevent a large spill.

The ROV and other control systems onboard the support vessels will have maintenance programs to reduce the likelihood of hydraulic fluid leaks. The ROV operator will also

conduct pre-dive checks prior to deployment. In the unlikely event of a release of hydraulic fluid to the environment, the low toxicity, water-based hydraulic fluids used in such systems are not expected to result in significant environmental impacts.

Deteriorating water quality and marine pollution are identified in relevant Recovery Plans and Conservation Advice (Table 4-3) as potential threats to a number of marine fauna species. However, with controls in place the objectives of the plans and advice will be met.

The potential impacts associated with loss of hydraulic fluids is considered to be minor. A number of controls have been evaluated above and adopted in accordance with the ALARP criteria (Section 6.3.1). The residual risk ranking is low. This is acceptable in accordance with Eni's acceptability criteria (Table 6-4). No additional controls were identified to further reduce risk. Given the low potential risk and the controls that will be implemented, Eni considers that the risks are acceptable and managed to ALARP.

## 8.9 Unplanned Seabed Disturbance (Risk ID 16)

### 8.9.1 Summary of Environmental Impact

**Further Sinking or Displacement of DSPM**

| Hazard | Further Sinking or Displacement of DSPM | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | A | 1 | L |

**Dropped Object**

| Hazard | Dropped Object | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 1 | L |
| Residual Risk | A | 1 | L |

**Loss of MODU mooring**

| Hazard | Loss of MODU mooring | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | B | 2 | L |
| Residual Risk | A | 2 | L |

### 8.9.2 Description of Hazard

It should be noted this unplanned seabed disturbance risk is only present prior to and during the planned removal activities (Section 3.8). Planned seabed disturbance from subsea equipment removal are described in Section 7.8.

#### 8.9.2.1 Further Movement of the Disconnectable Single Point Mooring Buoy

In 2020, the DSPM was noted to have sunk to the seabed (Section 3.5.3). The DSPM was previously situated 30 m below the sea surface, and now sits partially on the seabed. The buoy position remains within a 500 m PSZ.

The DSPM is 14 m in length and 8 m in diameter and is currently partially flooded. It is credible that further corrosion could result in the buoy filling entirely with seawater and lead to the buoy sinking further. Should further sinking of the DPSM to the seafloor occur, it has the potential to impact up to 112 m² (14 m by 8 m) of seabed habitat and any benthic invertebrates present.

#### 8.9.2.2 Dropped Object

During the recovery of equipment there is the potential for dropped objects to occur as a result of human error or failure of lifting equipment during the recovery of subsea equipment. The largest object that could be dropped is the DSPM. The spatial extent in which dropped objects can occur is restricted to Operational Area.

In the event that subsea infrastructure is dropped during the recovery activities, the lost equipment will be located and recovered, therefore these impacts will be temporary in nature. Equipment removal will occur after P&A, therefore impact to a free flow well cannot occur.

#### 8.9.2.3 Loss of MODU mooring

The MODU will be secured on station by a number of morning lines. High energy weather events such as cyclones, can lead to excessive loads on the mooring lines resulting in the failure of the lines and the MODU losing station, with anchors being trailed across the seabed.

Personnel on-board the MODU are typically evacuated during cyclones and support vessels are demobilised. While the MODU is temporarily abandoned, the position of the MODU is monitored remotely for any deviation.

Single mooring line failures are not expected to result in a loss of station. However partial or complete mooring failures may be sufficient to result in a loss of station. Partial mooring failures lead to smaller MODU movements due to the remaining anchors dragging along the seabed when compared to complete mooring failures which can lead to a fully floating MODU. However, partial mooring failure can result in anchor drag on the seabed until the point the MODU is recovered. NOPSEMA has recorded four cases of anchor drag due to loss of MODU holding station during cyclone activity between 2004 and 2015 (NOPSEMA 2015).

A loss of station may result in damage to a wellhead (e.g. tree knocked) should the anchors be dragged along the seabed in the Woollybutt field. This could result in a loss of loss of well integrity from a suspended well. In this event any gas or oil that has accumulated under the cap would be released and be replaced with water. After which point, the well would self-kill. The likely volume of gas/oil would be in the order of up to 30 bbl (5-10 bbl based on gas/oil cap length of 100-200 m, or up to 30bbl for cap length of 400m). The WB4 well is the only free flowing well in the Woollybutt field. Therefore, a loss of containment from this well is credible and the impacts of such an event are described in Section 8.5.

As described in Section 4.4.7, the Wheatstone pipeline lies within WA-25-L, approximately 1.5 km and 1.3 km to the west of the WB-4 and WB-5A well locations, respectively. Given the proximity, during the P&A of these wells using the moored MODU there is the potential for anchor drag to interact with this pipeline, although the likelihood of this occurring is low given the anchors would tend to drag inwards towards the MODU (i.e. away from the pipeline).

### 8.9.3 Potential Environmental Impact

The benthic fauna in region are expected to be widely represented on the shelf, further sinking or displacement of the DSPM or dropped object is not expected to result in widespread loss or degradation of environmentally significant habitats. Due to the localised area of disturbance, impacted benthic communities are expected to rapidly recolonise any damaged area. ROV footage confirms seabed is sandy/silty with no significant flora.

In the event of a loss of integrity from an impacted well or impact to the Wheatstone Pipeline and subsequent loss of containment, any impacts on the marine environment are expected to be within the envelope of the impacts of a worst case scenario subsea release due to loss of well control (Section 8.5), extended leak during field management (Section 8.6) and vessel marine diesel spill (Section 8.7).

The Wheatstone Pipeline contains gas and condensate. The shoreline and surface oil impacts from a loss of containment on the Wheatstone Pipeline at the WB-4 or WB-5A locations are expected to less than the impacts from a loss of well control (Section 8.5) or loss of well integrity (Section 8.6) due to the faster weathering and dispersion of gas and condensate compared with Woollybutt crude oil, and the shorter timeframe for pipeline source control compared with source control on WB-4, which would require 74-days for relief well drilling. The impacts of subsurface entrained hydrocarbons and subsurface dissolved aromatics are expected to be within the modelled scenario presented for the marine diesel spill (Section 8.7), which is the primary basis for the western and southern extents of the ZPI (Section 4.1). Where the MODU needs to be down-manned during cyclone, its position will be tracked and in the event of incursion into the pipeline exclusion zone, Eni will engage with the pipeline operator.

The environmental impacts associated with the discharge from a suspended well (except WBT-4) are likely to be highly localised and temporary, with only small amounts of trapped hydrocarbons released from the wellhead and annulus before the well pressure equalises and self-kills.

### 8.9.4 Environmental Performance Outcomes and Control Measures

Environmental Performance Outcomes (EPOs) relating to this risk include:

- seabed disturbance limited to the Operational Area (EPO-9)
- no loss of containment of hydrocarbons to the marine environment (EPO-13).

Control Measures relating to this risk include:

- field management (CM-4)
- removal of subsea equipment (CM-5)
- lifting procedures (CM-32)
- mooring analysis and design be undertaken and implemented (CM–35)
- MODU to be tracked if unmanned during cyclone (CM–36)

- adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised (CM–37)
- WB-5A wellhead removal will be performed with MSV where P&A is not required (Section 3.5.1.2), subject to vessel availability and operational requirements (CM-39)

Environmental Performance Standards and Measurement Criteria relating to the above are presented in Section 9.

### 8.9.5 ALARP Demonstration

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Eliminate | Removal of subsea equipment | The DSPM will be removed as per Section 3.8.<br>Benefits of removing the DSPM (e.g. removal of risk) outweigh the costs of its removal. | ✓ |
| | Eliminate MODU mooring | Allowance for IV or MODU use has been included to allow operational flexibility to conduct P&A in accordance with the schedule (Section 3.4). In the event a suitable IV cannot be contracted to complete the activities within the schedule, then a moored MODU may be required.<br>Should a MODU be selected, it is technically not feasible to use DP to conduct the P&A, therefore mooring is required. | × |
| | Eliminate MODU mooring – WB-5A | In the event that P&A activities are not required on WB-5A (Section 3.5.1.2), wellhead removal can be performed with an MSV, eliminating the need for mooring at this wellhead.<br>WB-5A wellhead removal will be performed by MSV where possible, subject to vessel availability and operational requirements. | ✓ |
| Substitute | N/A | N/A | N/A |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| Engineering | Field Management | Field management will be conducted as per the IMP (schedule in Section 3.4.1 and rationale in Section 3.7).<br>Field management will monitor the integrity of the DSPM until its removal. Application of remedial measure and field management will be applied as necessary.<br>Environmental benefit of field management on the schedule described in Section 3.4.1 outweighs the cost of hiring vessels and personnel etc. to undertake it. | ✓ |
| | More frequent field management (e.g. not on a risk based approach) | Provides no additional benefit. Field Management is based on a risk based approach and assigns frequencies based on the risk levels. Additional field management may be applied if anomalies are identified/ risk levels change or following risk events (e.g. cyclones).<br>Conducting field management when not required introduces additional risks (e.g. risks associated with vessel use, marine growth removal) and additional costs which grossly outweigh the environmental benefit. | × |
| Isolation | N/A | N/A. | N/A |
| Administrative | Lifting procedures | Lifting procedures will ensure that lifts are carried out in a safe manner and to reduce risk of dropped infrastructure. There is a minor administrative cost in following the procedure. Environmental benefits outweigh the cost. | ✓ |

| Demonstration of ALARP | | | |
|---|---|---|---|
| **Type** | **Control/ management** | **Evaluation** | **Adoption?** |
| | Mooring analysis and MODU tracking | A mooring analysis will be undertaken to determine the suitable mooring systems for the sea state and location, and ensure anchor locations will be clear of any seabed features or infrastructure.<br>The mooring analysis and design will be in accordance with API RP 2SK, API RP 16Q, MODU mooring in Australian tropical waters (MMATW) Guidelines and Eni specific requirements to ensure that design takes into account the risk of mooring in cyclonic conditions.<br>The MODU will have systems in place which allow it to be tracked when unmanned (e.g. during a cyclone). | ✓ |
| | Adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised | Will ensure that the MODU mooring occurs outside of the Wheatstone pipeline exclusion zone, limiting the chance of interactions. | ✓ |

### 8.9.6 Acceptability Demonstration

| Demonstration of Acceptability | |
|---|---|
| Compliance with Legal Requirements/Laws/ Standards | The Petroleum Activities Program is in compliance with EPBC 2001/365 approval. |
| Policy Compliance | Eni's HSE Statement objectives will be met. |
| Social Acceptability | Stakeholder consultation has been undertaken. No stakeholder concerns have been raised with regard to unplanned seabed disturbance. |
| Area Sensitivity/ Biodiversity | Benthic fauna present in the operational area are widely represented in the NWS. |
| ESD Principles | The impact assessment presented throughout this EP demonstrates compliance with the principles of ESD. |
| ALARP | The residual risk has been demonstrated to be ALARP. |

It should be noted this unplanned seabed disturbance risk is only present prior to the planned removal activities (Section 3.8). Planned seabed disturbance impacts from subsea equipment removal are described in Section 7.8.

Field management application will monitor the integrity and position of the DSPM. Field management is applied based on the schedule presented in Section 3.4.1 and rationale presented in Section 3.7. The findings from the field management campaigns may change the future frequencies of the field management activities if anomalies are identified.

Lifting procedures will be followed to reduce the risk of a dropped object (subsea equipment) during the equipment removal.

The residual risk ranking for an unplanned seabed disturbance is low. This is acceptable in accordance with Eni's acceptability criteria (Table 6-3). Given the low potential risk and the controls that will be implemented, Eni considers that the risk of unplanned seabed disturbance is acceptable and managed to ALARP.

## 8.10 Oil Spill Response (Risk ID 17)

### 8.10.1 Summary of Environmental Impact

| Hazard | Oil Spill Response Risk Assessment | | |
|---|---|---|---|
| | Frequency | Severity | Risk |
| Inherent Risk | A | 3 | L |
| Residual Risk | A | 1 | L |

### 8.10.2 Description of Hazard

In the event of a hydrocarbon spill, response strategies will be implemented where possible to reduce environmental impacts to ALARP. The selection of strategies will be undertaken through the Net Environmental Benefit Analysis (NEBA) process, outlined in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000). Spill response will be under the direction of the relevant Control Agency, as defined within the Woollybutt OPEP (000105_DV_PR.HSE.1045.000). The response strategies and supporting activities deemed appropriate for the oil spill scenarios for the activities are detailed in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000), and identified as:

- operational monitoring
- source control
- shoreline clean-up
- oiled wildlife response
- scientific monitoring.

Section 8.10.3 presents the evaluation on the implementation of these strategies and discounted strategies based on their suitability for the credible spill scenarios identified in this EP.

Response strategies are intended to reduce the environmental consequences of a hydrocarbon spill. However, the nature of some of the strategies (such as those requiring vessel use) means that environmental risk from their implementation is inevitable. In addition, lack of planned and coordinated response activities or guidance can result in inadequate response implementation causing further environmental impact.

All potential risks that may arise through implementation of response strategies are summarised in Table 8-17.

**Table 8-17: Summary of risks associated with implementation of response strategy**

| Risk | Operational monitoring | Source control | Shoreline Clean-up | Oiled Wildlife | Scientific monitoring |
|---|---|---|---|---|---|
| Vessel movements | X | X | X | - | X |
| Light emissions | X | X | X | X | X |
| Noise | X | X | - | X | X |
| Atmospheric emissions | X | X | X | - | X |
| Disturbance to natural habitat | - | - | X | X | |
| Operational discharge of waste | - | X | X | - | - |

Offshore risks are consistent with vessel operations described within this EP for the planned operations. The greatest potential for impacts additional to those described for planned operations are from oiled wildlife response, nearshore protection and deflection and shoreline clean-up operations where disturbance to the environment may occur through implementation efforts. Specific risks relating to response operations are described further below:

#### 8.10.2.1 Light Emissions

Spill response activities will involve the use of vessels which are required at a minimum, to display navigational lighting. Vessels may operate in close proximity to shoreline areas during spill response activities.

A maximum of 14.9 $m^3$ tonnes of Woollybutt crude may accumulate on the Ningaloo coastline, with much lower volumes (<5 $m^3$ of crude) at other shorelines (see Table 8-10). Onshore operations (where shoreline accumulation concentrations exceed 100 $g/m^2$) are only predicted at Barrow Island, Montebello Islands, Ningaloo Coast and Muiron Islands. The onshore response if required is expected to be confined to isolated areas/beaches and a shoreline response will only occur during daylight hours. A significant onshore response is not envisaged. However, spill response activities may involve onshore operations including the use of vehicles and temporary camps which may require lighting.

#### 8.10.2.2 Noise Emissions

Spill response activities will involve the use of vessels which will generate noise both offshore and in proximity to sensitive receptors in coastal areas. Noise emissions will be in-line with those described in Section 7.2.

Spill response activities will also involve the use of equipment on coastal areas during clean-up of shorelines (e.g. pumps and vehicles), for accessing shoreline areas (e.g. vehicles) and for supporting temporary camps (e.g. diesel generators).

#### 8.10.2.3 Atmospheric Emissions

The use of fuels to power vessel engines, generators and mobile equipment used during spill response activities will result in emissions of greenhouse gases (GHG). Atmospheric missions will be in-line with those described in Section 7.2.

Atmospheric emissions from spill response equipment will be localised and while there is potential for fauna and flora impacts, the use of mobile equipment, vessels and vehicles is not considered to create emissions on a scale where noticeable impacts would be predicted. Emissions may occur in protected areas; however, the scale of the impact relative to potential oil spill impacts is not considered great.

#### 8.10.2.4 Physical Presence and Disturbance

The movement and operation of response vessels, including anchoring and operating in the nearshore environment has potential to cause disturbance to the marine environment. Onshore, vehicles, personnel and equipment associated with the response strategy, have the potential to disturb the physical marine/coastal habitats and fauna. Vehicle, equipment and personnel associated with the strategy could also introduce or spread non-indigenous flora and fauna.

Oiled wildlife response activities may involve deliberate disturbance (hazing), capture, handling, cleaning, rehabilitation and release of wildlife which could lead to additional impacts to wildlife.

#### 8.10.2.5 Operational Discharges and Waste

Operational discharges offshore include those routine discharges from vessels used during spill response and will be the same as planned activities described in Section 7.5 and 7.6. Other specific waste streams include cleaning materials used for cleaning of oily equipment, flushing water used for cleaning the shoreline habitats, any waste from shoreline clean-up personnel or camps.

#### 8.10.2.6 Potential Environmental Impact

Offshore impacts are consistent with vessel operations described within this EP for the planned operations. Specific impacts relating to response operations risks, identified above are described further below:

#### 8.10.2.7 Light Emissions

Offshore lighting may cause behavioural changes to fish (including sharks), birds and marine turtles and have been described in planned risks Section 7.3.

Spill response activities which require lighting may also take place in nearshore and on shorelines through response strategy implementation. The receptors considered most sensitive to lighting from vessel and shoreline operations (in event of shoreline clean-up operations) are seabirds and marine turtles. Barrow Island and the Ningaloo coast have a number of turtle nesting beaches. During the nesting period (November to January) and hatching periods (December to March) turtle sensitivity to light will be greater.

However, given the scale of the response any impacts are expected to be short term, geographically confined and minor. In addition, shoreline operations will only be conducted in daytime hours and light impacts would be considered when locating any shoreline camps. Light impacts will also be considered in the operational NEBA process.

#### 8.10.2.8 Noise Emissions

Offshore noise may cause behavioural changes to marine mammals, turtles and fish and have been described in planned risks Section 7.2.

Spill response activity from onshore operations (noise generating mobile equipment and vehicles) has the potential to disturb nesting, roosting or feeding birds, as well as nesting turtles and other onshore fauna through noise and vibration. The shoreline response equipment used is not considered to have excessive sound levels and its use will also be considered in the operational NEBA process, the consequence to onshore fauna from noise is expected to be low. Given the scale of the response any impacts are expected to be short term, geographically confined and minor.

#### 8.10.2.9 Atmospheric Emissions

Offshore atmospherics may result in a temporary, localised reduction of air quality and have been described in planned risks Section 7.4.

Atmospheric emissions from spill response equipment will be localised and while there is potential for fauna and flora impacts, the use of mobile equipment, vessels and vehicles is not considered to create emissions on a scale where noticeable impacts would be predicted. Atmospheric emissions from spill response equipment is expected to be low.

#### 8.10.2.10 Physical Presence and Disturbance

The use of vessels may result from deployment of anchor/chain, nearshore booms and grounding and may disturb benthic habitats in coastal waters including corals, seagrass, macroalgae and mangroves if used in nearshore waters. Vessel use in shallow coastal waters also increases the chance of contact or physical disturbance with marine fauna such as turtles, dolphins which have been identified along the shorelines. The use of booms creates a physical barrier on the surface water and has the potential to entangle passing marine fauna that are either surface breathing or feeding.

Shoreline response activities may require vehicles, clean-up equipment and deployment of clean-up personnel which have the potential to damage coastal habitats such as dune vegetation, mangroves and habitats important to threatened and migratory fauna including nests of turtles and birds and bird roosting/feeding areas. Similarly, in the event that camps are required to be setup there is the potential that shorebirds and turtles nesting and feeding behaviours could be impacted

Impacts from offshore invasive marine species released from vessel biofouling include out-competition, predation and interference with other ecosystem processes as described in Section 8.1. In shallower coastal areas, such as areas where vessel-based spill response activities may take place, conditions are likely to be more favourable.

Impacts from terrestrial invasive species are similar to offshore, whereby the invasive species can out-compete local species (e.g. weeds) and interfere with ecosystem processes. Non-native species may be transported attached to equipment, vehicles and personnel clothing. Such an introduction would be especially detrimental to the relatively undisturbed flora and fauna communities along the Ningaloo coastline and Barrow, Montebello and Muiron Islands.

The disturbance to marine and coastal natural habitat, as well as the potential for disruption to culturally sensitive areas may have flow on impacts to socio-economic values and industry (e.g. tourism, fisheries).

A NEBA will take into account the vehicles and equipment selected and will aim to reduce habitat damage. The establishment of access routes/demarcation zones, and operational restrictions on equipment/vehicles use will limit sensitive habitat damage and damage to important fauna areas. Camps will only be setup following consultation with the relevant regulatory bodies. Following these and other control measures the resultant consequence to the physical environment and habitat is assessed as low.

As with all spill response activities, response strategies which may cause habitat disturbance will be considered in the operational NEBA process. It is not considered that an extensive shoreline clean-up operation, requiring multiple camps and significant vehicle/equipment use if required, given the volumes of accumulated hydrocarbons on the shorelines. Disturbance will therefore be short term, geographically confined and minor and only occur if there is a net benefit to accessing and cleaning shoreline areas.

#### 8.10.2.11 Operational Discharges and Waste

Offshore operational discharges from vessels may create a localised and temporary reduction in water quality and have been described in planned risks Section 7.5 and 7.6.

In nearshore areas operational discharges of could potentially occur adjacent to marine habitats such as corals, seagrass, macroalgae, which support a more diverse faunal community. However, discharges are expected to be very localised and temporary.

Cleaning of oil contaminated equipment or vehicle may spread oil from contaminated areas to those areas not impacted by a spill, potentially spreading the impact area if not contained and moving oil into a more sensitive environment.

Flushing of oil from shoreline habitats is a used to remove oil from the receptor that has been oiled and remobilise back into the marine environment and result in further dispersion and evaporation of the oil. The process of flushing has the potential to physically damage shoreline receptors such as mangroves communities, increase levels of erosion. However flushing risk will be considered in the operational NEBA process and only undertaken if there is a net benefit.

Sewage, putrescible and municipal waste will be generated from onshore activities at temporary camps which may include toilet and washing facilities. These wastes have the potential to attract fauna, impact habitats, flora and fauna and reduce the aesthetic value of the environment. Sewage, putrescible and municipal waste generated onshore will be stored and disposed of at approved locations.

As with all spill response activities, response strategies which may result in waste streams will be considered in the operational NEBA process and will only occur if there is a net benefit. There will be low volumes of waste expected given the low shoreline accumulation volumes. Minimal waste is therefore expected to be generated and impacts from waste are anticipated to be as short term, geographically confined and minor.

### 8.10.3 Spill Response Strategies

A number of oil spill response strategies have been evaluated for implementation in the event of a spill. Strategy identification is based on strategies which have been implemented in the past or considered to be good industry practice. Table 8-18 presents the evaluation on the implementation of these strategies based on their suitability for the credible spill scenarios identified in this EP.

The key considerations taken into account in the evaluation were as follows:

- properties and weathering profile of the Woollybutt crude (Section 8.5.2) and marine diesel
- nature and scale of the credible spill scenario
- safety and environmental risks and impacts involved with the response.

**Table 8-18: Spill response strategies considered for the mitigation of contact from hydrocarbon spills**

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| Source control | Well Intervention | Applicable to:<br>• subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (12,592 m³ over 88 days).<br>All four suspended shut in wells were producing with assistance of gas lift. Of four suspended shut-in wells, WB4 is the only well currently capable of flowing naturally. The other three wells can produce limited gas/oil/water (due to the presence of small gas cap in the well) and will be then naturally killed by the hydrostatic of the water produced from the reservoir. The analysis had been modelled using OLGA software in house. The non-free flowing wells, in the event of a blowout event during P&A would be contained through self-kill. | **Woollybutt Crude** | **Adopt** |
| | | | **Marine Diesel** | **Reject** |
| | Deployment of subsea first response toolkit | Applicable to:<br>• subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (11,144.8 m³ over 88 days).<br>Subsea first response equipment has the ability to clean around the WH, enable intervention and prepare for relief well drilling and installation of a capping device.<br>A Subsea First Response Toolkit (SFRT) and capping stack may be mobilised to site if technical and safety considerations allow and would be mobilised concurrently with relief well activation and mobilisation. | **Woollybutt Crude** | **Adopt** |
| | | | **Marine Diesel** | **Reject** |

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| | Installation of a capping stack | Applicable to:<br>• subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days) and the spill cannot be contained through intervention<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (12,592 m³ over 88 days).<br>A capping stack is designed to be installed on a subsea well and provides a temporary means of sealing the well, until a permanent well kill can be performed through either a relief well or well re-entry.<br>A Subsea First Response Toolkit (SFRT) and capping stack may be mobilised to site if technical and safety considerations allow and would be mobilised concurrently with relief well activation and mobilisation. | **Woollybutt Crude** | **Adopt** |
| | | | **Marine Diesel** | **Reject** |
| | Drilling a relief well | Applicable to:<br>• subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (12,592 m³ over 88 days).<br>The drilling of relief well is considered to be the primary control in event of a loss of well control and will be implemented regardless of any other controls in place. This control when implemented successfully will prevent further loss of hydrocarbon to the environment. | **Woollybutt Crude** | **Adopt** |
| | | | **Marine Diesel** | **Reject** |
| | Vessel SOPEP | Applicable to diesel spills from vessels only.<br>Vessel collision leading to release of marine diesel<br>Refuelling.<br>SOPEP is the procedure for responding to a ruptured fuel tank or bunkering incident. | **Woollybutt Crude** | **Reject** |
| | | | **Marine Diesel** | **Adopt** |

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| Monitor and evaluate | Monitor and evaluate is used to predict and monitor the trajectory and fate of the spill, to determine the effectiveness of response strategies and to identify and report on any potential/actual contacts to flora, that occurs. | Applicable to:<br>• vessel collision leading to release of marine diesel<br>• refuelling<br>• subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days)<br>• subsea release of Woollybutt crude during field management due to corrosion and valve failure (12,592 m³ over 88 days).<br>There are various specific techniques (vessel/aerial surveillance, oil spill modelling) within this response strategy which may be suitable. Use will be based on the spill fate/volumes as well as other considerations such as access to locations and environmental/metocean conditions.<br>Monitor and evaluate is used to inform further response planning and execution and the operational NEBA. | **Woollybutt Crude** | **Adopt** |
| | | | **Marine Diesel** | **Adopt** |
| | Subsurface chemical dispersant involves dispersant | | **Woollybutt Crude** | **Reject** |

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| Subsea chemical dispersant | applied directly into the WH location at the release point. Subsea chemical dispersant injection is used to disperse the oil either to enable safe implementation of the subsequent controls. | The dispersibility of Woollybutt crude was tested in 2002 by Geotechnical Services Ltd (Geotech, 2002). Coreexit was applied to the dispersant in two tests:<br>• Test (purge and trap and whole oil analysis) on the effect of Coreexit 9527 on Woollybutt crude in a water column designed to simulate conditions on the North West Shelf.<br>• Test involving dispersing 100 mL of the oil on a 4 L water column using 10 mL (neat) of Corexit 9527.<br>Based on the results from the purge and trap, and whole oil analyses, after the addition of Corexit 9527, the dispersant has not had a significant effect on the Woollybutt crude. However, from the additional experiment where 10 mL of Corexit 9527 was mixed with 100 mL of oil there does appear to be a depletion of the oil slick (approximately 10% reduction). It is therefore concluded that the application of dispersant is not anticipated to have a significant effect on the reduction of oil.<br>A qualitative assessment has also been made that chemical dispersant would be ineffective on Woollybutt crude: Although possible for Group II oil, the size of potential spill volume and the natural tendency of spreading into very thin films is evidence that dispersant application will be an ineffective response. The dispersant droplets will penetrate through the thin oil layer and cause 'herding' of the oil which creates areas of clear water and should not be mistaken for successful dispersion (see ITOPF – Technical Information Paper No. 4: The Use of Chemical Dispersants to Treat Oil Spills).<br>The injection of subsea dispersants will increase the concentration of entrained oil and dissolved aromatic hydrocarbons within deeper waters and near the seabed. This could potentially result in increased impacts to seabed habitat in the vicinity of the well. However, the application of subsea dispersants is expected to reduce the wide-scale spatial distribution of entrained oil including the 500 ppb impact threshold and also the surface oiling.<br>Given there the application of subsea chemical dispersant is not determined to be of net environmental benefit. | **Marine Diesel** | **Reject** |

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| Surface chemical dispersion | Chemical dispersant is applied to break down the hydrocarbons and allow/enhance dispersion into the water column, thereby preventing/reducing potential shoreline contact and increasing biodegradation. | Diesel is not conducive to chemical dispersion due to rapid evaporation and low surface concentrations.<br>As above. The application of dispersant is not anticipated to have a significant effect on the reduction of oil.<br>In addition the Woollybutt crude weathering results for the variable-wind case indicate that the wind conditions will have a large impact on the proportion of oil that remains afloat, with very little oil mass predicted to persist on the sea surface (<1% after 24 hours). | **Woollybutt Crude** | **Reject** |
| | | | **Marine Diesel** | **Reject** |
| Physical dispersion | Physical dispersion is undertaken by running vessels through the hydrocarbon plume and using the turbulence developed by the propellers or hydro-blasting from vessel hydrants to break up the slick. The process enhances dispersion. | Diesel and Woollybutt crude are not conducive to physical dispersion due to low surface concentrations.<br>Surface hydrocarbons in the event of a 250 bbl per day leak were not expected to exceed 10 g/m². Surface hydrocarbons in the event of a 900 bbl per day well-blowout were only expected to exceed 10 g/m² in the immediate vicinity of the well. | **Woollybutt Crude** | **Reject** |
| | | | **Marine Diesel** | **Reject** |
| Containment and recovery | Containment and recovery of hydrocarbons can offer a preventive form of protection to sensitive receptors. Skimmers (mechanical) and booms will be used at sea.<br>This strategy is only effective in calm conditions. | Diesel and Woollybutt crude are not conducive to physical dispersion due to low surface concentrations.<br>Surface hydrocarbons in the event of a 250 bbl per day leak of Woollybutt crude were not expected to exceed 10 g/m². Surface hydrocarbons in the event of a 900 bbl per day well-blowout of Woollybutt crude were only expected to exceed 10 g/m² in the immediate vicinity of the well.<br>Containment and recovery is effective on oil concentrations > 50 g/m² and therefore not effective. | **Woollybutt Crude** | **Reject** |
| | | | **Marine Diesel** | **Reject** |

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| Protection and deflection | Protection and deflection activities involve the use of booms to deflect spills away from sensitive receptors and deflect spills to an area that provides increased opportunity for recovery activities. | This strategy will be dependent on the shoreline location and metocean conditions. Booms may be used to deflect the hydrocarbon away from highly sensitive habitats. Activities are focused on areas of high protection value in low energy environments when metocean conditions are favourable for an effective implementation.<br>Diesel and Woollybutt crude are not conducive to physical dispersion due to low surface concentrations.<br>In addition, no surface hydrocarbons are expected to at the shorelines from a 250 bbl per day leak of Woollybutt crude or 900 bbl per day well-blowout of Woollybutt crude. | **Woollybutt Crude** | **Reject** |
| | | | **Marine Diesel** | **Reject** |
| Shoreline clean-up | During a spill response, clean-up of the oiled shorelines will be implemented using suitable methods, provided it will be beneficial to the environment based on the NEBA performed on the affected areas based on actual site conditions. | Applicable to:<br>• Subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 $m^3$ over 365 days).<br>Contacted shorelines will be assessed for their shoreline clean-up potential based on an Operational NEBA. The clean-up can have the potential to remediate the shoreline quicker than if being left to natural remediation.<br>Natural collection points along the coastline will be the focus of the shoreline clean-up.<br>If turtle or seabird nesting season, there may be less impact not undertaking shoreline clean-up.<br>There is no shoreline accumulation from a 900 bbl per day well-blowout of Woollybutt crude or a diesel spill. Shoreline accumulation > 100 $g/m^2$ may occur in the event of a shorelines from a 250 bbl per day leak of Woollybutt crude over 365 days. Owens and Sergy (1994) define accumulated hydrocarbon < 100 $g/m^2$ to have an appearance of a stain on shorelines. French-McCay (2009) defines accumulated hydrocarbons ≥ 100 $g/m^2$ to be the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat. | **Woollybutt Crude** | **Adopt** |
| | | | **Marine Diesel** | **Reject** |

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| Oiled wildlife response (OWR) | Oiled wildlife response aims at preventing wildlife from becoming oiled and/or the treatment of animals that do become oiled. | Applicable to:<br>• Subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days)<br>The shorelines of Barrow Island, Murion Islands, Montebello Islands and the Ningaloo coast have the potential for hydrocarbons in the event of a 250 bbl per day leak of Woollybutt crude for 365 days.<br>These shorelines have been identified as having potential wildlife inhabiting them. Mobilisation of experts, trained work forces, facilities and equipment will then be needed. Wildlife response activities may take place at sea, on shorelines and in specialised treatment facilities further inland.<br>Options for wildlife management have to be considered and a strategy determined guided by the Western Australian Oiled Wildlife Response Plan (WAOWRP).<br>Turtle nesting occurs between the months of December to January, and hatchlings can be expected between February and March. Avifauna are present year round. | **Woollybutt Crude** | **Adopt** |
| | | | **Marine Diesel** | **Reject** |
| In-situ burning | Technique involves the controlled burning of oil that has spilled (from a vessel or a facility).<br>On conducive hydrocarbons, and when conditions are favourable and conducted properly, in-situ burning will reduce the amount of oil on the water. | For in-situ burning to be undertaken oil has to be thicker than 1-2 mm.<br>Diesel is not conducive to in-situ burning due to rapid evaporation and low surface concentrations.<br>Surface hydrocarbons in the event of a 250 bbl per day leak of Woollybutt crude were not expected to exceed 10 g/m². Surface hydrocarbons in the event of a 900 bbl per day well-blowout of Woollybutt crude were only expected to exceed 10 g/m² in the immediate vicinity of the well. | **Woollybutt Crude** | **Reject** |
| | | | **Marine Diesel** | **Reject** |

| Strategy | Description | Applicability and Environmental Benefit | Hydrocarbon type | Adopted/ Reject |
|---|---|---|---|---|
| Operational and Scientific Monitoring | This is the main tool for determining the extent, severity and persistence of environmental impacts from an oil spill and allows operators to determine whether their environmental protection outcomes have been met (via scientific monitoring activities). This strategy also evaluates the recovery from the spill. | Applicable to:<br>• Vessel collision leading to release of marine diesel<br>• Subsea release of Woollybutt crude due to loss of well control during P&A activities (10,589 m³ over 74 days)<br>• Subsea release of Woollybutt crude during field management due to corrosion and valve failure (14,490.5 m³ over 365 days)<br>• Subsea release of Woollybutt crude during field management due to corrosion and valve failure (12,592 m³ over 88 days).<br>Scientific monitoring is especially beneficial for the purpose of monitoring entrained and dissolved oil impacts as response strategies are generally targeted to manage the surface oil impacts. | **Woollybutt Crude**<br>**Marine Diesel** | **Adopt**<br>**Adopt** |

### 8.10.4 Spill Response and Operational Monitoring Plan Strategies ALARP Assessment

Table 8-19 presents an ALARP assessment on the level of resourcing for spill response strategies identified for adoption in Table 8-18.

Table 8-20 presents an ALARP assessment on the level of resourcing for Operational Monitoring Plan (OMP) strategies spill response strategies identified in the Woollybutt Operational and Scientific Monitoring Plan (000105_DV_PR.HSE.1025.000).

**Table 8-19: ALARP assessment of the level of resourcing available for spill response strategies**

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| **Source control** | | | | | |
| Relief well | Relief well plan in place for Woollybutt wells.<br>APPEA MoU provides for access to other Operator's rigs. | A number of source control options have been evaluated for the Table 8-18. Of these source control options, the drilling of a relief well is considered the primary means of controlling the source in the event of an unplanned well release. | Having a MODU on location permanently and under contract to Eni for relief well drilling. This additional control could reduce the length of time taken to source a relief well. | Having a MODU on location (and personnel on standby) for drilling top-hole sections of a relief well would reduce the time frame to source a relief well. However, given the location of the field within a relative high oil and gas area, is it likely that a MODU could be sourced within relative proximity. Since the daily rate of a MODU is ~$555,000 per day, the cost of having a MODU on standby or contracted for drilling top-holes is disproportionate to the environmental benefit, particularly given that the low likelihood of shoreline contact. | Having a MODU and personnel/equipment on standby would double the cost of drilling a well; this is considered grossly disproportionate to the environmental benefit (reduction of 2 weeks of release volumes), particularly considering that the spill is predicted to largely weather and evaporate offshore with minimal shoreline contact. |
| **Monitor and Evaluate** | | | | | |
| Aerial surveillance | Helicopter services available through Eni primary contracted supplier based out of Darwin and Truscott, WA. Visual observation – from aircraft/ helicopter can be | Given location of spill site, mobilisation helicopters from Darwin or WA is considered adequate for surveillance.<br>If aerial surveillance is required, an over-flight schedule is developed by the IMT. The frequency of flights | Resource not considered limiting.<br>Primary supplier of aerial surveillance on contract with additional providers available to provide desired overpass frequency. Trained | No additional cost to maintain capability as helicopters are currently contracted for other operational needs.<br>In the event that additional overpasses are required due to data gaps the cost of the | There is no value in increasing capabilities, therefore the arrangements are considered ALARP however opportunistic aerial surveillance can be provided through the shared use of |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| | made within 24 hours of mobilisation.<br>Aircraft are also available through AMOSC and AMSA.<br>Trained observers will be sourced from AMOSC, AMSA and OSRL to undertake the required aerial surveillance in the event of a spill. Can make visual observations within 24 hours of mobilisation. | will be sufficient to ensure that the information collected during each flight (i.e. observer log and spill mapping) meets the information needs to validate dispersion of the spill. | observers can be provided on rotation 24 hours after mobilisation. | additional flights will be added to the cost of the response. | aircraft deployed for other purposes. |
| Vessel surveillance | Vessel of opportunity (VOO) from other operators.<br>Vessels on location during P&A activities.<br>Additional vessels contracted through Eni vessel provider. Visual observations from these vessels occur within 72 hours of mobilisation. | Additional mobilisation of vessels can be made through Eni's contracted vessel providers.<br>This strategy is not designed to perform 'whole of spill' coverage which is provided by aerial surveillance (i.e. it is a secondary strategy). | Eni contract additional vessels or purchase vessels specifically for spill response monitoring to be able to respond immediately. | Based on the likelihood of vessels available on site during activities (P&A activities), additional vessels for the purpose of oil spill surveillance is not required.<br>In the event of a spill when a vessel is not available (leak scenario) it is considered that aerial surveillance will be adequate to monitor the spill initially.<br>Surveillance will also be conducted through a number of complementary strategies (aerial surveillance, oil spill | There is no benefit in having additional dedicated surveillance vessels given surveillance can be performed from any vessel and these duties will be shared amongst spill response vessels. |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| | | | | trajectory modelling, satellite monitoring).<br>The current vessels arrangements and contracts are considered to provide the required function.<br>Dedicated vessels on standby for vessel surveillance would cost tens of thousands of dollars per day and are not considered required. | |
| Satellite Monitoring | Eni has contracted KSAT to provide satellite monitoring for its operations.<br>KSAT has a 24/7 Emergency Image Delivery Service and stand-by support. | KSAT will operate out of its Tromsø Network Operations Centre (TNOC) in Norway. KSAT will provide Near Real-Time services for oil spill and support vessel detection targeting delivery in 15 minutes from data availability (in the case of a spill being detected or suspected).<br>The SAR satellites will provide two images per day and a report shall be provided daily to Eni. | Additional contracts with satellite monitoring providers. | Resource is not considered limiting with no environmental benefit from dedicating additional monitoring capability<br>KSAT provide satellite monitoring through a contract with Eni. | There is no environmental benefit in having additional satellite monitoring capabilities |
| Oil spill trajectory modelling (OTSM) | The OSTM will be sourced, via AMOSC or Eni HQ, within 24 hours using their 24/7 emergency capability. | The modelling supplier can provide updates to the IMT of trajectory model outputs to inform response planning. | Additional contracts with oil spill trajectory modelling providers | Predictive oil spill modelling will be used to forecast (using real-time data) the trajectory and fate of the spill. Resource is not considered limiting with no environmental benefit from | There is no environmental benefit in having additional modelling capabilities. |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| | OSTM is also available through panel consultants. | | | dedicating additional modelling capability.<br>Supplied through AMOSC or Eni HQ. As a member company of AMOSC, Eni has access to AMOSC's oil spill recovery and response equipment, training, technical capabilities along with those resources held by member companies as outlined in the AMOSPlan.<br>Eni HQ in Milan maintains oil spill trajectory modelling capability and also have 24/7 emergency capability. | |
| **Shoreline clean-up** | | | | | |
| Shoreline clean-up | Manual clean-up and flushing equipment (AMOSC, AMSA)<br>Clean-up team leaders (through AMOSC and AMSA)<br>Labour personnel (labour hire as required)<br>Eni has arrangements in place with TOLL Group, which includes vessel hire such as barges, | Maximum shoreline accumulation above 100 g/m² is 11.2 tonnes at Ningaloo Region. Other locations contact is predicted include Barrow Island (2.6 tonnes), Muiron Islands (2.3 tonnes) and Montebello Islands (1.5 tonnes). Existing equipment and that available through AMOSC/AMSA arrangements is considered to be sufficient given the low volumes. | The main limitation of undertaking a shoreline clean-up response is based around access for plant and personnel to remote offshore island locations.<br>Additional resources may include permanent pre-positioning clean-up equipment on the shoreline prior to a spill event occurring. | During a spill event, the cost of additional resources is not considered; the limiting factor is considered to be numbers of personnel available to undertake shoreline clean-up.<br>Mobilising additional personnel to undertake shoreline clean-up via vessel to remote offshore locations presents increased associated health and safety risks. Personnel mobilised via helicopter is limited to 10 passengers per trip. Once at the locations there is a | The level of resources available are considered to be appropriate, given the shoreline accumulation volumes are minor. The outcome of oil spill modelling/surveillance and a NEBA would be used to identify priorities for protection at specific locations given the time of year e.g. during turtle nesting season, where |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| | vessels and landing craft from Darwin.<br>Time for the shoreline assessment team to be deployed will be 24 hours from mobilisation. | | | need to provide adequate facilities. | shoreline clean-up efforts would be directed at nesting beaches.<br>Decision to implement shoreline clean-up will be undertaken by the IMT when the findings of the NEBA demonstrate that shoreline clean-up techniques used will deliver environmental benefits. |
| **Waste management** | | | | | |
| Waste management | Assorted waste receptacles and trucks.<br>Waste personnel – project manager, local responsible personnel and operations personnel.<br>Eni has arrangements in place through its logistics provider, which has a number of barges, vessels and landing craft available.<br>A standing contract exists between Eni | Eni's waste services provider is contracted to provide ongoing waste storage, transport and disposal requirements. | TOLL Group has access to sufficient resources for the worst case waste clean-up requirements; there is no benefit to acquiring additional resources specifically for the activity.<br>In the event of a well blowout (Section 8.5) or diesel release (Section 8.7) shoreline contact is not anticipated at threshold. In the event of a well leak (Section 8.6), shoreline accumulation is a gradual process due to the nature of a slow | The logistics contract provides resources to meet waste management requirements. | Resources are considered to be adequate and ALARP.<br>Waste volumes recovered from clean-up are considered to be low based on the shoreline accumulation volumes (Table 8-10). |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| | and a logistics provider for the transport and disposal of waste. | | leak, with low level hydrocarbons accumulating over time. | | |
| **Oiled wildlife response** | | | | | |
| Oiled wildlife response | Oiled wildlife response kits and containers available through AMOSC.<br>OWR personnel | The trajectory modelling of the hydrocarbon released in a crude scenario predicts the spatial extent of floating oil concentrations are not predicted to exceed the moderate (10 g/m²) greater than 2 km from the spill location. Therefore, widespread physical oiling to wildlife is unlikely offshore. OWR may be undertaken onshore in the event of a shoreline contact.<br>All OWR efforts would be undertaken in consultation with DBCA, and Eni would undertake the response following the outcome of an operational NEBA that would direct efforts for maximum effectiveness. | Pre-positioning of staging areas and responders has been considered for this spill scenario given worst case shoreline accumulation is from a leak scenario and is slow release (250 bpd)<br>As Eni has access to OWR kits through third party agreements that can be mobilised in a timely manner, it is not considered to be necessary to increase resources.<br>Purchasing of an OWR kit by Eni has been discounted as any OWR would be in consultation with DBCA upon completion of a NEBA. | The cost of personnel (Level 1 responders) on standby is $1,500 per person per day. Given that personnel on this level can be arranged within relatively short timeframes through other bodies there is not considered sufficient environmental value in having dedicated OWR responders on standby. | Based on the minimum timeframe for oil contact (predicted 5 days) and the nature of the crude and the release (leak scenario), resourcing required for OWR is considered to be within the capacity of existing response arrangements are considered ALARP. |

**Table 8-20: ALARP assessment of the level of resourcing available for Operational Monitoring Plan (000105_DV_PR.HSE.1025.000) strategies**

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| **OMP1: Monitoring of Surface Hydrocarbon Distribution at Sea and Marine Megafauna Observations** | | | | | |
| Aerial surveillance | Refer to Monitor and Evaluate in Table 8-19, above. | | | | |
| Vessel surveillance | Refer to Monitor and Evaluate in Table 8-19, above. | | | | |
| Satellite Monitoring | Refer to Monitor and Evaluate in Table 8-19, above. | | | | |
| Oil spill trajectory modelling (OTSM) | Refer to Monitor and Evaluate in Table 8-19, above. | | | | |
| Unmanned aerial vehicle (UAV) | Access to various Unmanned Ariel Vehicle (UAV) providers via OSRL on a best endeavours basis | UAVs provide an additional monitoring capacity to cover specific areas of interest identified during the response via aerial or vessel surveillance. UAVs are accessed through OSRL as they require trained operators and specific maintenance. | Purchasing UAVs and training Eni personnel as operators, so UAV access can be guaranteed immediately in the event of a spill. | Cost of purchasing UAVs and training personnel outweighs benefit. Given that the main strategy for monitoring the spill is from aerial surveillance (helicopter) and vessel surveillance, purchasing UAVs specifically and training Eni personnel as operators does not result in better coverage of the spill initially and is a costly process. The access to UAVs through an existing OSRL contract is aimed to monitor specific areas identified by the vessel and aerial surveillance and its use is not required immediately | There is no environmental benefit in purchasing UAVs and training Eni personnel as UAV operators given coverage of the spill can initially be made using vessels and aerial observation. |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| | | | | during the spill event. In addition sensitive shoreline receptors which may be monitoring using a UAV are not anticipated to be contacted in the event of a well blowout (Section 8.5) or diesel release (Section 8.7) anticipated. In the event of a well leak (Section 8.6). | |
| Aerial surveillance trained observer | Trained observers will be sourced from AMOSC, AMSA and OSRL to undertake the required aerial surveillance in the event of a spill. Can make visual observations within 24 hours of mobilisation. | In the event of a well blowout (Section 8.5) or diesel release (Section 8.7) shoreline contact is not anticipated at threshold. The spill will move with the currents and sensitive receptors are not anticipated to be contacted by surface oil. In the event of a well leak (Section 8.6) shoreline accumulation shoreline accumulation is a gradual process, due to the nature of a slow leak, with low level hydrocarbons accumulating over time.<br>Given the spill size, a large scale response is not required. Mobilising aerial surveillance trained observers within 24 hours is considered adequate. | Access to personnel in less than 24 hours to monitor the spill | Does not provide any additional environmental benefit or quicker coverage of the spill. Visual observation – from aircraft/ helicopter can be made within 24 hours of mobilisation. Access to vessels and aerial surveillance would be a limiting factor and has been discussed in Table 8-19, above. | Costs of having personnel ready to mobilise in less than 24 hours to monitor the spill grossly outweighs the environmental benefit. Access to personnel is not a limiting factor<br>Does not provide any additional environmental benefit or quicker coverage of the spill. |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| **OMP2: Monitoring of Hydrocarbons: Weathering and Behaviour in Marine Waters** | | | | | |
| Water sampling equipment to detect hydrocarbon presence and estimate oil concentrations | Access to:<br>1 x Turner C3 Fluorometer (submersible)<br>1 x OSRL fluorometry unit operator<br>Within 24 hours via OSRL | Fluorometers and backscatter sensors to detect hydrocarbon presence and estimate oil concentrations in the marine environment.<br>Access timing aligns with access to the vessel (24 hours) | Access to additional fluorometers | Provides no additional benefit. Additional fluorometers can be mobilised, however not within 24 hours. Given the size of the spill, one fluorometer has been determined to be required initially. | No additional environmental benefit gained |
| Autonomous underwater vehicle to provide understanding of entrained hydrocarbons | Access to:<br>1 x Autonomous underwater vehicle (AUV) with fluorometry sensor<br>1 x AUV engineer<br>On a best endeavours basis via OSRL | Autonomous underwater vehicle to provide understanding of entrained hydrocarbons. | Contracted access within a defined timeframe (e.g. 34 hours) | High cost with little environmental benefit. Submersible fluorometers are able to provide an assessment of hydrocarbon presence in first instance. | No additional environmental benefit gained |
| **OMP3: Shoreline Assessment Surveys** | | | | | |
| Shoreline assessment team and surveyors | Shoreline assessment team<br>Shoreline surveyors<br>Onsite within 5 days, or 24 hours prior to shoreline contact (if prolonged time to shoreline contact).<br>Access through: AMOSC, National Plan | In the event of a well blowout (Section 8.5) or diesel release (Section 8.7), shoreline contact is not anticipated at threshold. The spill will move with the currents and sensitive receptors are not anticipated to be contacted by surface oil. In the event of a well leak (Section 8.6) shoreline accumulation is a gradual process, due to the nature of a | Additional access of shoreline assessment personnel within 5 days. | Does not provide any additional benefit given the spill size, area of shoreline contacted and time to contact (5.9 days). | No environmental benefit gained from access to personnel within 5 days. |

| Strategy | Resourcing | Justification | Additional resource consideration | Proportionality – cost/benefit | ALARP assessment |
|---|---|---|---|---|---|
| | resources through AMSA, OSRL | slow leak, with low level hydrocarbons accumulating over time.<br>Given the spill size, area of shoreline contacted and time to contact (5.9 days), a large scale shoreline assessment response is not required. Access to personnel through AMOSC, National Plan resources through AMSA, OSRL is determined adequate. | | | |
| Unmanned aerial vehicle (UAV) | Refer to OMP1: Monitoring of Surface Hydrocarbon Distribution at Sea and Marine Megafauna Observations, above | | | | |
| Aerial surveillance | Refer to Monitor and Evaluate in Table 8-19, above. | | | | |
| Vessel surveillance | Refer to Monitor and Evaluate in Table 8-19, above. | | | | |

### 8.10.5 Environmental Performance Outcomes and Control Measures

For EPOs, EPS and measurement criteria relating to spill response in event of a spill during this activity, refer the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

# 9 ENVIRONMENTAL OUTCOMES, STANDARDS AND MEASUREMENT CRITERIA

Regulations 13(7) of the OPGGS (E) Regulations require an EP to include environmental performance outcomes, environmental performance standards, and measurement criteria that:

- address legislative and other controls that manage environmental features of the activity
- define objectives and set standards for measuring Eni's performance in protecting the environment during its operations, and
- including measurement criteria for assessing whether performance outcomes and standards have been met.

The terms used for measuring the environmental performance are defined below:

- performance outcome – a statement of the goal that Eni aim to achieve with regard to the management of a given hazard
- performance standard – a statement of performance required of a system, an item of equipment, a person or a procedure that is used as a basis for managing environmental risk. Generally, a number of standards may relate to a single objective
- measurement criteria – defines how the application of the performance standard will be verified. Several measurement criteria may relate to a single performance standard. Measure criteria are defined in a manner that enables efficient inspection and/or audit against the performance outcomes, and allows for an audit trail.

To ensure environmental risks and impacts will be of an acceptable level, environmental performance outcomes have been defined and are listed in Table 9-1. These outcomes will be achieved by implementing the identified control measures to the defined performance standards.

**Table 9-1: Environmental performance outcomes**

| Reference | Environmental Performance Outcomes |
|---|---|
| EPO-1 | Information is provided to regulatory authorities and marine users directly affected by planned activities |
| EPO-2 | Activity is managed in accordance with navigational and safety requirements |
| EPO-3 | No unplanned interactions with other marine users (EPO-3) |
| EPO-4 | No injury or mortality to EPBC Act and WA Biodiversity Conservation Act 2016 listed fauna during operational activities |
| EPO-5 | Atmospheric emissions in compliance with Marine Order 97 requirements to restrict emissions to those necessary to perform the activity |
| EPO-6 | No unplanned discharge of oily water or chemicals (EPO-6) |
| EPO-7 | No unplanned discharges to sea of untreated sewage, greywater, putrescible wastes, bilge and deck drainage |
| EPO-8 | Routine P&A chemical discharges are ALARP and acceptable |
| EPO-9 | Seabed disturbance limited to the Operational Area |
| EPO-10 | No introduction of marine pest species to Australia from the activities |
| EPO-11 | No unplanned releases of solid hazardous or non-hazardous waste to the marine environment |
| EPO-12 | No vessel collision with protected marine fauna during the activity (whales, whale shark and turtles) |
| EPO-13 | No loss of containment of hydrocarbons to the marine environment |
| EPO-14 | Currency of information to the assessment of impact and risk maintained |

## 9.1 Control Measures and Performance Standards

The control measures that will be used to manage identified environmental impacts and risks, and the associated statements of performance required of the control measure (i.e. environmental performance standards) are listed in Table 9-2. Measurement criteria outlining how compliance with the control measure, and the expected environmental performance, could be evidenced are also listed. A separate set of performance standards based on the oil spill response operational control measures are included in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

**Table 9-2: Control Measures and Environmental Performance Standards**

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-2**<br>**EPO-3**<br>**EPO-16** | **CM-1**<br>Navigation equipment and procedures | **EPS-1.1.**<br>IV/MODU and support vessels compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 30 (Prevention of Collisions) 2009:<br>• Adhere to steering and sailing rules including maintaining look-outs (e.g. visual, hearing, radar etc.), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar).<br>• Adhere to navigation light display requirements, including visibility, light position/shape appropriate to activity.<br>• Adhere to navigation noise signals as required. | **MC-1.1.**<br>IV/MODU and support vessels have a current (< 12 months) IMCA or OVID certificate prior to mobilisation | **1** |
| | | **EPS-1.2.**<br>IV/MODU and support vessels compliant (where applicable) with standard maritime safety/navigation procedures including AMSA Marine Order Part 21 (Safety of Navigation and Emergency Procedure) 2012:<br>• Adherence to minimum safe manning levels.<br>• Maintenance of navigation equipment in efficient working order (compass/radar).<br>• Navigational systems and equipment required are those specified in Safety of Life at Sea (SOLAS) Chapter V (Regulation 19).<br>• Automatic Identification System (AIS) installed as required by vessel class in accordance with SOLAS Chapter V (Regulation 19). | **MC-1.2.**<br>IV/MODU and support vessels have a current (<12 months) IMCA or OVID certificate prior to mobilisation | |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-1**<br>**EPO-3** | **CM-2**<br>Maritime notices – Notices to Mariners (NTM) and AUSCOAST warnings | **EPS-2.1.**<br>The Australian Hydrographic Office (AHO) is notified 4 weeks prior to commencing P&A operations so they can then issue a Notice to Mariners. | **MC-2.1.**<br>Notice to AHO completed | **1** |
| | | **EPS-2.2.**<br>The AMSA Rescue Coordination Centre (RCC) (as part of marine safety division) will be notified of the P&A operations 4 weeks prior to mobilisation to ensure navigation AUSCOAST warnings can be issued and kept up to date. | **MC-2.2.**<br>Notice to AMSA RCC completed | |
| **EPO-1**<br>**EPO-2**<br>**EPO-3**<br>**EPO-13** | **CM-3**<br>Petroleum safety zone established to reduce potential for collision or interference with other marine user activities | **EPS-3.1.**<br>A 500 m PSZ maintained around the Woollybutt subsea wells and DSPM and communicated to marine users to prevent unauthorised vessels entering the 500 m PSZ. | **MC-3.1.**<br>Records shows no vessels entered the 500 m PSZ without permission | **1** |
| **EPO-3**<br>**EPO-13** | **CM-4**<br>Field Management | **EPS-4.1.**<br>Field Management is implemented on Woollybutt subsea infrastructure in accordance with Section 3.4.1 and 3.7 of the EP to ensure Eni can:<br>• meet obligations under section 572 of the OPGGS Act<br>• ensure the presence of the subsea infrastructure is not causing unacceptable environmental impacts or risks. | **MC-4.1.**<br>Field management records demonstrate inspection frequencies, and maintenance if required, occurs on Woollybutt subsea structures, as per the Woollybutt Integrity Management Plan (20-061-PL-001) | **1**<br>**13**<br>**16** |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-3**<br>**EPO-13** | **CM-5**<br>Removal of subsea equipment | **EPS-5.1.**<br>Removal of equipment occurs as per Section 3.8.<br>In the event that any of the above components/equipment cannot be retrieved in a safe manner, the components/ equipment can be wet-stored on the seabed until decommissioning activities, subject to a future decommissioning EP submission. | **EPS-5.1.**<br>Removal of equipment has occurred as per Section 3.8, unless equipment cannot be retrieved in a safe manner, in which case it is wet-stored on the seabed until decommissioning activities | **1**<br>**16** |
| **EPO-4**<br>**EPO-12** | **CM-6**<br>Regulations and measures for interacting with marine fauna | **EPS-6.1.**<br>EPBC Regulations 2000 – Part 8 for interacting with marine fauna are enforced during the activities, including Part 8 Division 8.1 (Regulation 8.05):<br>• A vessel will not travel greater than 6 knots within 300 m of a whale (caution zone) and not approach closer than 100 m from a whale.<br>• A vessel will not approach closer than 50 m or a dolphin and/or 100 m for a whale (with the exception of animals bow riding). | **MC-6.1.**<br>Conformance to EPBC Regulations 2000 – Part 8 is checked on receipt of marine fauna sighting datasheets | **2**<br>**11** |
| | | **EPS-6.2.**<br>EPBC Regulations 2000 – Part 8 for interacting with marine fauna are enforced during the activities, including Part 8 Division 8.1 (Regulation 8.06) – Interacting with calves, which requires:<br>• vessel will not approach closer than 300 m to a calf (whale or dolphin) (the caution zone)<br>• then the vessel must be immediately stopped; and must either:<br>• turn off the vessel's engines, or<br>• disengage the gears, or<br>• withdraw the vessel from the caution zone at a constant speed of less than 6 knots. | | |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| | | **EPS-6.3.**<br>Helicopters will comply with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.07), which includes the following measure:<br>• Helicopters shall not operate lower than 1,650 feet or within a horizontal radius of 500 m of a cetacean known to be present in the area, except for take-off and landing. | | |
| **EPO-4**<br>**EPO-12** | **CM-7**<br>Marine fauna observations/ reporting undertaken | **EPS-7.1.**<br>Marine Fauna Sighting Data submitted to DoAWE. | **MC-7.1.**<br>Records of Marine Fauna Sighting Data submission to DoAWE | **2**<br>**11** |
| **EPO-5** | **CM-8**<br>Air pollution prevention certification | **EPS-8.1.**<br>IV/MODU and support vessels comply with MARPOL 73/78 Annex VI, as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Part IIID Prevention of air pollution), and Marine Order 97 (marine pollution prevention – air pollution 2007, as required by vessel class:<br>• IV/MODU and support vessels have valid International Air Pollution Prevention Certificate (IAPP) where required. | **MC-8.1.**<br>Current IAPP certificate or equivalent for IV/MODU and support vessels | **4** |
| | **CM-9**<br>Fuel type used | **EPS-9.1.**<br>Marine Order 97 compliant fuel oil is used by vessels. | **MC-9.1.**<br>Records of fuel type for vessels shows use of low sulphur fuel when available | |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-6** | **CM-10**<br>Oily water treatment system is in place | **EPS-10.1.**<br>IV/MODU and support vessels comply with Marine Orders 91 – oil (as relevant to vessel class) requirements which include mandatory measures for the processing of oily water prior to discharge including:<br>• 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.<br>• 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.<br>• 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.<br>• There shall be a waste oil storage tank available, to restrict oil discharges.<br>• 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. | **MC-10.1.**<br>Records demonstrate vessels are compliant with Marine Order 91 – pollution prevention (as appropriate to vessel class) | **5** |
| **EPO-6**<br>**EPO-7** | **CM-11**<br>Oily water prevention system in place | **EPS-11.1.**<br>Valid International Oil Pollution Prevention Certificate, which confirms that required measures to reduce impacts of planned oil discharges are in place on vessels. | **MC-11.1.**<br>Current International Oil Pollution Prevention Certificate or equivalent is available for vessels | **5** |
| | | **EPS-11.2.**<br>Preventative maintenance on oil filtering equipment completed as scheduled on vessels. | **MC-11.2.**<br>Maintenance records or evidence of maintenance in operational reports available for vessels | |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-7** | **CM-12**<br>Sewage and waste management | **EPS-12.1.**<br>IV/MODU and support vessels comply with MARPOL 73/78 Annex V (Prevention of pollution by garbage)/Marine Order 95 (Marine pollution prevention – garbage):<br>• Putrescible waste will only be discharged to sea if comminuted to 25 mm or less and discharged en route when greater than 3 nautical miles from the 'territorial sea baseline'.<br>• If putrescible waste is not comminuted to 25 mm or less, it will be discharged greater than 12 nautical miles from the territorial sea baseline while en route. | **MC-12.1.**<br>Records demonstrate vessels are compliant with Marine Order 95 – pollution prevention (as appropriate to vessel class) | **6** |
| | | **EPS-12.2.**<br>Vessels comply with Marine Order 96 – pollution prevention – sewage (as appropriate to vessel class) which include the following requirements:<br>• a valid International Sewage Pollution Prevention Certificate, as required by vessel class<br>• an ASMA approved sewage treatment plant<br>• a sewage comminuting and disinfecting system<br>• a sewage holding tank sized appropriately to contain all generated waste (black and grey water)<br>• discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 NM from the nearest land<br>• 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<br>• discharge of sewage will occur at a moderate rate while support vessel is proceeding (> 4 knots), to avoid discharges in environmentally sensitive areas. | **MC-12.2.**<br>Records demonstrate vessels have valid International Sewage Pollution Prevention Certificates | **6** |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-8** | **CM-13**<br>Chemical selection Process (Section 3.9.1) is followed | **EPS-13.1.**<br>P&A and field management chemicals will be assessed in accordance with the Chemical Assessment Process (Section 3.9). | **MC-13.1.**<br>ALARP assessment documentation shows chemicals requiring further assessment are ALARP and selected in accordance with the Chemical Assessment Process (Section 3.9) | **7** |
| | | **EPS-13.2.**<br>P&A and field management chemicals selected have ALARP assessment completed as required by the Chemical Assessment Process(Section 3.9). | | **7** |
| | **CM-14**<br>Excess dry bulk cement which is surplus to requirements of a P&A well will be retained and used on the next P&A well. At the end of the P&A campaign it will either be provided to the next operator or discharged to the marine environment | **EPS-14.1.**<br>Excess dry bulk cement which is surplus to requirements of a P&A well will be retained and used on the next P&A well. At the end of the P&A campaign it will either be provided to the next operator or discharged to the marine environment. | **MC-14.1.**<br>Daily reports and end of well reports show excess cement is retained for use on next P&A well or discharge details at the end of the P&A campaign | **7** |
| **EPO-10** | **CM-15**<br>Implementation of an IMS risk assessment check tool, applied to IV/MODU and support vessels | **EPS-15.1.**<br>IV/MODU and support vessels to be risk assessed (e.g. the DPIRD vessel check tool or similar) demonstrating vessels and IV/MODU are at 'low risk' of introducing invasive marine species.<br>IMS management measures will be applied to vessels to reduce IMS risk to 'low risk'. | **MC-15.1.**<br>Completed vessel check report demonstrating IV/MODU and support vessels are 'low risk' of IMS | **9** |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| | | **EPS-15.2.**<br>Vessel check assessment has been reviewed or completed by member of the Eni HSE Team. | **EPS-15.2.**<br>Records show vessel check assessment has been reviewed completed by member of the Eni HSE Team | |
| | **CM-16**<br>IV/MODU and support vessels have approved ballast water treatment method/system | **EPS-16.1.**<br>Compliance with Australian Ballast Water Management Requirements (as defined under the *Biosecurity Act 2015*) (aligned with the International Convention for the Control and Management of Ships' Ballast Water and Sediments) to prevent the introduction of IMS. | **MC-16.1.**<br>Administrator-approved ballast water management plan<br>Completed ballast water record book or log | **9** |
| | **CM-17**<br>IMS management measures applied to IV/MODU and support vessels | **EPS-17.1.**<br>IMS management measures will be applied to IV/MODU and support vessels according to risk to minimise the likelihood of IMS being introduced (such as the treatment of internal systems, IMS Inspections or cleaning) to minimise the likelihood of IMS being introduced and reduce risk to 'low risk'. | **MC-17.1.**<br>Records of management measures which have been implemented where identified to reduce risk to 'low' | **9** |
| **EPO-11** | **CM-18**<br>Hazardous and Non-Hazardous Waste Management processes are implemented | **EPS-18.1.**<br>IV/MODU and support vessels comply with measures outlined in MARPOL 73/78 Annex V (Prevention of pollution by garbage/ Marine Order 95 (Marine pollution prevention – garbage) as required by vessel class:<br>• Vessel(s) will have a Garbage Management Plan in place which outlines procedures for handling storing, processing and disposing of garbage. | **MC-18.1.**<br>Garbage Management Plan in place for IV/MODU and support vessels | **10** |
| | | **EPS-18.2.**<br>A garbage record book shall be maintained with details of non-hazardous and hazardous waste volumes generated and transferred for onshore recycling or disposal. | **MC-18.2.**<br>Garbage record book in place for IV/MODU and support vessels | |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| | | **EPS-18.3.**<br>All hazardous and non-hazardous wastes generated at sea will be retained on IV/MODU and support vessels and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). | **MC-18.3.**<br>Hazardous and non-hazardous wastes records for IV/MODU and support vessels | |
| | | **EPS-18.4.**<br>All personnel will be notified of the correct waste management procedures through the induction process. | **MC-18.4.**<br>Waste management procedures included in induction material for IV/MODU and support vessels | |
| | | **EPS-18.5.**<br>All hazardous wastes and chemicals will be stored in a bunded area capable of containing leakage or spillage, prior to onshore disposal. | **MC-18.5.**<br>Inspection Report shows all hazardous wastes and chemicals are stored in a bunded area capable of containing leakage or spillage | |
| | | **EPS-18.6.**<br>NORMs Management Plan is in place and adhered to. The plan includes:<br>• During the equipment retrieval campaign, a Radiation Inspector will be on board the vessel to inspect equipment for NORMs.<br>• If NORMs are identified, the affected equipment will be stored in a dedicated, demarcated area on the vessel and segregated from other equipment. | **MC-18.6.**<br>Records show that Radiation Inspector is on board the vessel to inspect equipment for NORMs and NORMs identified equipment is stored in a dedicated, demarcated area on the vessel and segregated from other equipment | |
| **EPO-13** | **CM-19**<br>Accepted Well Operations Management Plan (WOMP) | **EPS-19.1.**<br>Well Operations Management Plan (WOMP) (000036_DV_PR.D&C. 1028.000) includes control measures for well integrity that reduce the risk of an unplanned release of hydrocarbons. | **MC-19.1.**<br>Acceptance letter from NOPSEMA demonstrates the WOMP is accepted | **12**<br>**13** |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| | | **EPS-19.2.**<br>The WOMP demonstrates that at least two isolation barriers are in place between the reservoir and the environment. | | |
| **EPO-13** | **CM-20**<br>Safety Case | **EPS-20.1.**<br>Safety Case for P&A includes control measures for well control that reduce the risk of an unplanned release of hydrocarbons. | **MC-20.2.**<br>Acceptance letter from NOPSEMA demonstrates the safety case is accepted prior to P&A | **12** |
| **EPO-13** | **CM-21**<br>Well Control Equipment specification and function testing is undertaken | **EPS-21.1.**<br>Well Control Equipment (WCE) installed during P&A operations. Specification and function testing is undertaken in accordance with:<br>• the NOPSEMA-approved WOMP<br>• Eni Well Control Manual STAP-P-1-MG-26524;<br>• Original Equipment Manufacturer (OEM) Standards. | **MC-21.1.**<br>Records demonstrate that WCE and WCE control system specifications and function testing were in accordance with minimum standards for the expected P&A conditions | **12** |
| **EPO-13** | **CM-22**<br>Eni Source Control Response Plan (ENI-WOP-PL-001) and its addendum | **EPS-22.1.**<br>Eni Source Control Response Plan (ENI-WOP-PL-001) and addendum detail:<br>• relief well design<br>• simulation of the dynamic kill<br>• high level requirement for the rig and the equipment, volumes and the pumping pressures. | **MC-22.1.**<br>Source Control Response Plan and addenda detail:<br>• relief well design<br>• simulation of the dynamic killing level requirement for the rig and the equipment, volumes and the pumping pressures. | **12** |
| **EPO-13** | **CM-23**<br>Mutual aid MoU for relief well drilling is in place | **EPS-23.1.**<br>Mutual Aid MoU for relief well drilling is in place which allows for expedited use of drilling rig for relief well drilling. | **MC-23.1.**<br>Records show Mutual aid MoU for relief well drilling is in place | **12** |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-13** | **CM-24**<br>Relevant well site personnel hold International Well Control Forum certificates | **EPS-24.1.**<br>Relevant well site personnel to hold valid International Well Control Forum certificates. | **MC-24.1.**<br>Relevant well site personnel to hold valid International Well Control Forum certificates | **13** |
| **EPO-13** | **CM-25**<br>Satellite imagery will be processed every 14 days to detect surface slicks | **EPS-25.1.**<br>Satellite imagery is processed every 14 days to detect surface slicks. | **MC-25.1.**<br>Satellite data imagery data and date of files shows processing every 14 days | **13** |
| **EPO-13** | **CM-26**<br>P&A Activities | **EPS-26.1.**<br>P&A targets an execution window given in Section 3.4.2. | **MC-26.1.**<br>Records show P&A is targeting an execution window given in Section 3.4.2 and is P&A once operations are completed | **12** |
| **EPO-13** | **CM-27**<br>Bulk refuelling transfer procedures | **EPS-27.1.**<br>Bunkering procedure implemented for all hydrocarbon vessel bunkering and helicopter refuelling activities, and will include the following requirements:<br>• A completed PTW and/or JSA shall be implemented for the hydrocarbon bunkering/refuelling operation.<br>• Visual monitoring of gauges, hoses, fittings and the sea surface during the operation.<br>• Hose checks prior to commencement. | **MC-27.1.**<br>Records demonstrate refuelling undertaken in accordance with contractor bunkering procedures | **14** |
| | | **EPS-27.1.**<br>Bunkering not undertaken in adverse weather conditions and addressed within JSA. | **MC-27.2**<br>Records demonstrate consideration of daylight and weather conditions prior to undertaking bunkering/refuelling operations | |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| | **CM-28**<br>Vessel spill response plan (SOPEP) | **EPS-28.1.**<br>SOPEP kept on board IV/MODU and support vessels and contains plans in case of an oil spill to prevent spills reaching the marine environment, as appropriate to vessel class. | **MC-28.1.**<br>Approved SOPEP available onboard IV/MODU and support vessels, as appropriate to vessel class. | **14** |
| **EPO-13** | **CM-29**<br>On board spill response kits | **EPS-29.1.**<br>Spill response kits located in proximity to hydrocarbon storage/bunkering areas and appropriately stocked/replenished as required to prevent spills reaching the marine environment. | **MC-29.1.**<br>Inspection Report completed show spill kits located in proximity to hydrocarbon storage/bunkering areas | **14** |
| **EPO-13** | **CM-30**<br>ROV equipment maintenance | **EPS-30.1.**<br>ROV is maintained in accordance with manufacturer recommendations. | **MC-30.1.**<br>ROV maintenance records | **15** |
| | **CM-31**<br>Pre-dive ROV checks | **EPS-31.1.**<br>A ROV check is conducted prior to dive which includes check of line/connection integrity. | **MC-31.1.**<br>ROV pre-dive checklist is completed and shows check of line/connection integrity | **15** |
| **EPO-13** | **CM-32**<br>Lifting procedures | **EPS-32.1.**<br>Lifting Operations Standard ENI-HSE-ST-007 details processes to reduce risk of dropped object, including:<br>• competency of persons undertaking lift<br>• planning and preparation process for undertaking lifts. | **MC-32.1.**<br>Lifting Operations have been made in accordance with Lifting Operations Standard ENI-HSE-ST-007 | **16** |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-13** | **CM-33**<br>Decommissioning Planning | **EPS-33.1.**<br>Eni will develop a Woollybutt Decommissioning Plan. The plan will detail how Eni meets its commitments under the OPGGS(E) Regulations:<br>• Remove or cause to have removed from the title (WA-25-L) all Woollybutt property brought into the title, unless alternative arrangements have been accepted by NOPSEMA.<br>The plan will include, as a minimum, the following details:<br>• regulatory obligations<br>• a schedule and key milestone<br>• stakeholder consultation plans<br>• Woollybutt infrastructure, status and removal plans<br>• decommissioning studies and future requirements<br>• risk assessments on the decommissioning. | **MC-33.1.**<br>A Woollybutt Decommissioning Plan is developed and includes:<br>• regulatory obligations<br>• a schedule and key milestone<br>• stakeholder consultation plans<br>• Woollybutt infrastructure, status and removal plans<br>• decommissioning studies and future requirements<br>• risk assessments on the decommissioning. | N/A |
| | | **EPS-33.2.**<br>All Woollybutt infrastructure will be completely removed within 12 months of completing P&A scope, in accordance with Section 572(3) of the OPGGS Act, unless NOPSEMA approves and is satisfied that an alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared with complete removal. | **MC-33.2.**<br>Records show that Woollybutt infrastructure is removed within 12 months of completing P&A scope, in accordance with Section 572(3) of the OPGGS Act, unless NOPSEMA approves and is satisfied that an alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared with complete removal. | N/A |
| **EPO-1** | **CM-34**<br>Notify marine users of the location of the CB1 wellhead and that | **EPS-34.1.**<br>Eni will notify relevant State and Commonwealth fisheries that the CB1 wellhead will remain in-situ | **MC-34.1.**<br>Records show State and Commonwealth fisheries are notified of the CB1 wellhead location and that the wellhead will remain in- situ | 1 |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| | it will remain in-situ permanently | **EPS-34.2.**<br>Eni will notify AHO to ensure CB1 wellhead is marked on nautical charts | **MC-34.2.**<br>Records show CB1 wellhead is marked on nautical charts. | 1 |
| **EPO-9**<br>**EPO-13** | **CM-35**<br>Mooring Analysis Design be undertaken and implemented | **EPS-35.1.**<br>Mooring analysis is completed and designed to maintain its integrity in the expected activity operating conditions and ensure anchors located clear of seabed obstacles.<br>The mooring analysis and design will be in accordance with API RP 2SK, API RP 16Q, MODU mooring in Australian tropical waters (MMATW) Guidelines and Eni specific requirements to ensure that design takes into account the risk of mooring in cyclonic conditions. | **MC-35.1.**<br>Mooring Analysis and Design completed demonstrating appropriate mooring design for conditions and in accordance with API RP 2SK, API RP 16Q, MODU mooring in Australian tropical waters (MMATW) Guidelines and Eni specific requirements. | 8<br>16 |
| | | **EPS-35.2.**<br>Anchors installed as per mooring design analysis | **MC-35.2.**<br>Records demonstrate mooring design is implemented | |
| **EPO-9** | **CM-36**<br>MODU to be tracked when unmanned (e.g. during cyclone) | **EPS-36.1.**<br>MODU tracking equipment operational when is MODU unmanned | **MC-36.1.**<br>Records show MODU has tracking equipment for instances when MODU is unmanned | 16 |
| **EPO-1**<br>**EPO-13** | **CM-37**<br>Adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised | **EPS-37.1.**<br>Adherence to the Wheatstone pipeline exclusion zone unless otherwise authorised | **MC-37.1**<br>Records show that activities were planned and occurred outside of the Wheatstone pipeline exclusion zone unless otherwise authorised | 1<br>14 |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-1**<br>**EPO-13** | **CM-38**<br>Consultation with the Wheatstone pipeline operator during planning and operations | **EPS-38.1.**<br>Consultation with the Wheatstone pipeline operator to ensure P&A and any pipeline maintenance activities will be spatially and temporally separated. | **MC-38.1**<br>Records show that consultation with the Wheatstone pipeline operator during planning and operations for the activities | 1<br>14 |
| | | **EPS-38.2.**<br>Consultation with the Wheatstone pipeline operator in relation to emergency arrangements prior to commencing P&A activities | **MC-38.2**<br>Records show that consultation with the Wheatstone pipeline operator in relation to emergency arrangements prior to commencing P&A activities | 1<br>14 |
| **EPO-9** | **CM-39**<br>WB-5A wellhead removal will be performed with MSV where P&A is not required (Section 3.5.1.2), subject to vessel availability and operational requirements | **EPS-39.1.**<br>WB-5A wellhead removal will be performed with MSV where P&A is not required (Section 3.5.1.2), subject to vessel availability and operational requirements | **MC-39.1**<br>Records show that WB-5A wellhead removal is performed with MSV where P&A is not required | 16 |
| **Additional Controls Identified** | | | | |
| **EPO-1** | **CM-35**<br>Regulatory notification issued to NOPSEMA | **EPS-35.1.**<br>NOPSEMA notified that the P&A activities is to commence at least 10 days before the activity commences. | **MC-35.1.**<br>Submitted Regulation 29(1) | N/A |
| | | **EPS-35.2.**<br>NOPSEMA notified that the P&A activities is completed within 10 days after finishing. | **MC-35.2.**<br>Submitted Regulation 29(2) notification form | N/A |

| EPO References | Control Measure (CM) | Environmental Performance Standards (EPS) | Measurement criteria (MC) | Risk ID |
|---|---|---|---|---|
| **EPO-19** | **CM-36**<br>Review of the EP Risks prior to P&A operations | **EPS-36.1.**<br>A review of the EP will be undertaken prior to P&A operations being undertaken to ensure that risks remain ALARP and are pertinent to the activity. | **MC-36.1.**<br>Documented review of the EP has been recorded | N/A |

# 10 IMPLEMENTATION STRATEGY

The purpose of the implementation strategy section is to manage the activities and their associated environmental risks to ALARP and ensure environmental performance is monitored. Regulation 14(1) of the OPGGS (E) Regulations requires that the EP contain an implementation strategy. To meet this Regulation, this Section:

- describes the environmental management system for the activity, including specific measures to be used to ensure that, for the duration of the activity:

  (a) the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as ALARP

  (b) control measures detailed in the environment plan are effective in reducing the environmental impacts and risks of the activity to as low as reasonably practicable and an acceptable level, and

  (c) environmental performance outcomes and standards set out in the environment plan are being met. (Regulation 14[3]).

- establishes of a clear chain of command and the setting out of roles and responsibilities of personnel responsible for the implementation, management and review of the EP (Regulation 14[4])
- presents measures to ensure all personnel directly undertaking works or associated works related to the activity have the appropriate competencies and training and are aware of their responsibilities under this EP (Regulation 14[5])
- provides sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the environment plan are being met (Regulation 14[6])
- provides for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met (Regulation 14[7])
- includes a process for maintaining an Oil Pollution Emergency Plan (OPEP) (Regulation 14[8]).

This section presents the implementation strategy for the Petroleum Activities Program.

## 10.1 Systems, Practices and Procedures

### 10.1.1 HSE Management System Overview

Eni's management of HSE matters is arranged hierarchically in two distinct levels:

1. Corporate level Management System
2. Regional (Eni Australia) level HSE Integrated Management System (HSE IMS);

Within Eni Australia, HSE management is delivered at the regional and asset level through the Eni HSE IMS which is the means by which all HSE hazards and risks are controlled. The HSE IMS refers to the totality of Eni Australia's management systems in terms of the:

- concepts, policies, strategies, HSE goals, processes, procedures and work instructions that comprise the formal content of the HSE IMS
- organisational structures, communication systems, safety-related data, roles and responsibilities, competencies and training needed by the personnel in order to implement the HSE IMS
- physical elements of the that are critical to safety (equipment, structures and engineered systems), including the codes and standards used to design and construct them.

This section provides a description of Eni's HSE IMS from the corporate level through to implementation.

### 10.1.2 Eni Corporate Management System Guidelines

Eni Australia adopts the guidelines provided by its corporate parent Eni Upstream which issued a Divisional Directive for the development of Management System Guideline – HSE (MSG-HSE-ENI-SPA-eng). This chapter provides structure and guidance notes for SMS development based on the five main elements and 18 sub-elements of the system shown below in Figure 10-1.

These elements are largely based on the structure of ISO 14001 and OSHAS 18001 series of standards and therefore provide a consistent and recognisable platform for the management of safety, while also ensuring the intent of the principle of continuous improvement is followed.

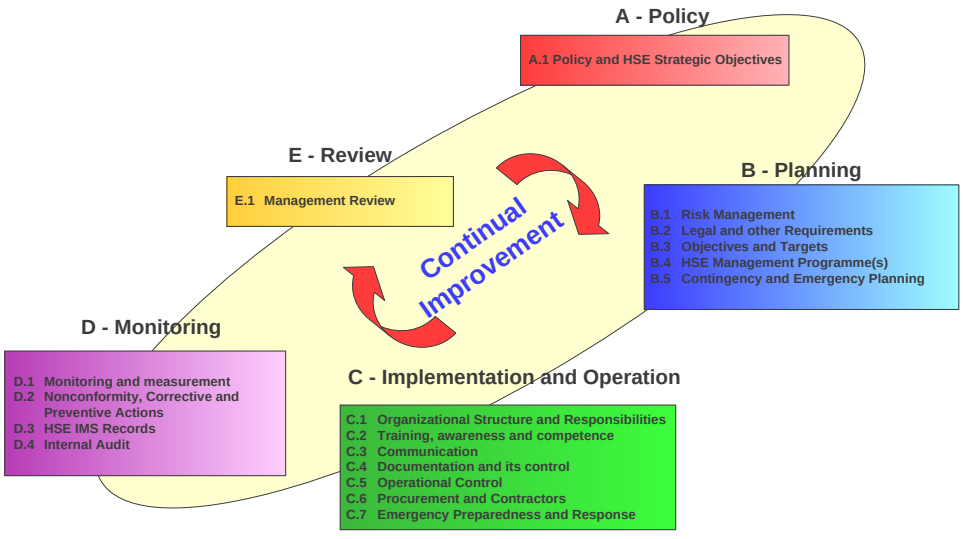



**Figure 10-1: Eni HSE IMS five elements**

### 10.1.3 Regional Eni Australia Health, Safety and Environment Integrated Management System

The Eni Australia HSE IMS, which covers Woollybutt field management and P&A activities, has been certified against the following standards:

- ISO 14001: Environmental Management System
- OHSAS 18001: Occupational Health and Safety Management System
- AS/NZS 4801: Occupational Health and Safety Management System.

In addition, the system uses the guidelines of ISO 17776 in its overall risk assessment approach.

Audits are performed to verify conformance with these standards and the Eni Upstream Corporate Directive.

The current HSE IMS structure is illustrated in and shows the interface between Eni Australia's HSE IMS and the asset-level management system. Note that the structure provided is guidance only and is subject to change.

The HSE IMS Framework Document (ENI-HSE-IN-002) serves as the key reference for Eni Australia's HSE IMS and is an information source for Eni employees and contractors.

The HSE IMS Framework Document provides an overview of the strategies that are used to manage HSE aspects of Eni Australia's operations including emergency response, risk and security, and ensure their continual improvement in line with established objectives and targets. This document also describes the core elements of the HSE IMS and their interaction with related documentation.

The HSE IMS Framework Document sets out a number of functional requirements for HSE management. Eni Australia has developed a set of supporting documents that provide standards, processes, guidelines and criteria and information by which the functional requirements can be met. The documents are generally classified as either information (IN), standards (ST), procedures (PR) or specification (SP) documents.

The HSE Standards cover a broad range of high-risk activities and outline Eni Australia's minimum requirements and expectations across its operations. The HSE Standards complement the Eni Australia HSE Golden Rules, and are based on worldwide IOGP (International Oil & Gas Producers association) and company best practices.

The HSE Standards apply to all personnel working on Eni sites, whether they are employee, contractor or visitor. The Standards apply to activities where Eni has direct operational control but also apply to activities where Eni has a prevailing influence over the performance of its contractors and suppliers.

The HSE IMS Framework document also describes how occupational health and safety are managed by Eni Australia in a style promoted by a philosophy of objective or risk based regulation and continuous improvement.

At the apex of the system is Eni's HSE Statement (Appendix A). The statement is approved by the Managing Director and provides a public statement of Eni's commitment to the environment and improving environmental performance.

## 10.2 Roles and Responsibilities

### 10.2.1 Field Operations

Figure 10-2 presents the organisational structure in place for Woollybutt Operations and project roles. Table 10-1 summarises key roles and responsibilities personnel and contractors for implementing Woollybutt Petroleum Activities Program.

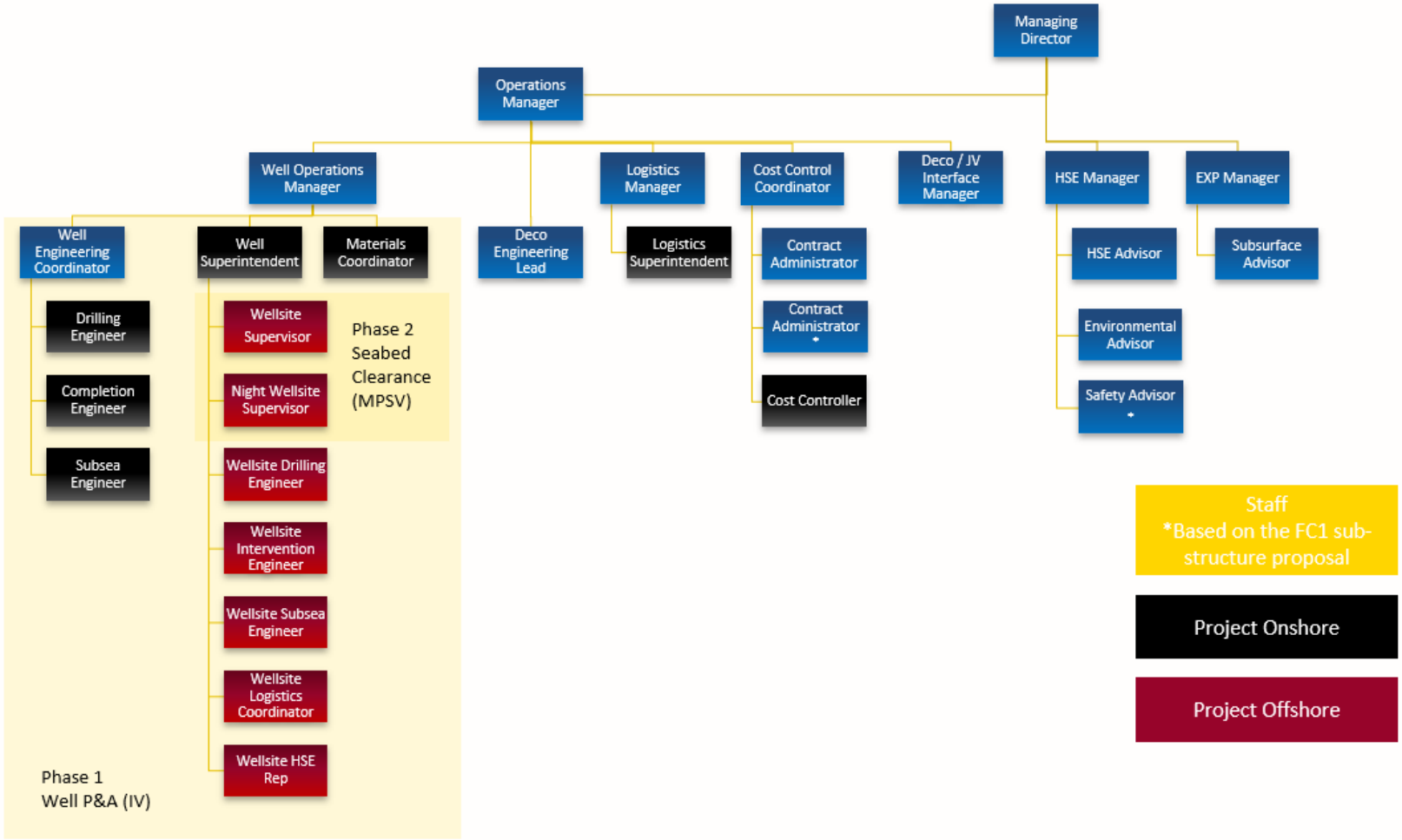



**Figure 10-2: Woollybutt Eni operations organisation and proposed project roles**

**Table 10-1: Key roles and responsibilities for HSE management**

| Role | Responsibilities |
|---|---|
| **Onshore personnel** | |
| Managing Director | Overall responsibility for HSE and ensuring resources are available to effectively implement this EP.<br>Approving this EP and confirming that all significant environmental risks have been identified and that mitigation strategies will be implemented. |
| Operations Manager (office-based) | Implementing the HSE IMS within the operational area, by the application of the EP.<br>Approving this EMP and confirming that all significant environmental risks have been identified and that mitigation strategies will be implemented.<br>Allocating personnel with the relevant competencies to specific roles in accordance with the Eni organisation chart and position descriptions.<br>Assisting the IMT/CMT in the event of an emergency.<br>Ensuring Notice to Mariners are issued and maintained.<br>Notifying NOPSEMA of the details of reportable incidents and providing updates on the status of the incident (Section 10.8). |
| Well Operations Manager (Designated Project Manager) | Reviewing this EP and confirming all environmental risks have been identified, mitigation strategies are effective and will be undertaken during P&A and equipment removal activities, including emergencies or potential emergencies.<br>Ensuring:<br>• compliance with all environmental regulations and the EP<br>• that the requirements of the EP are communicated to Third Party contractors<br>• all personnel are inducted and are aware of their environmental responsibilities<br>• environmental audits are undertaken on support vessels to verify compliance with the EP<br>• all equipment is maintained and in an operable condition<br>• actions are tracked in an action register, implemented and closed out, including corrective actions identified during audits<br>• waste is managed on all vessels according to this EP.<br>Reporting all environmental incidents to the Operations Manager, HSE & CSR Manager and IMT Leader. |
| Decommissioning Lead (office based) | Reviewing this EP and confirming all environmental risks have been identified, mitigation strategies are effective and will be undertaken during P&A and equipment removal activities, including emergencies or potential emergencies.<br>Ensuring:<br>• compliance with all environmental regulations and the EP<br>• that the requirements of the EP are communicated to Third Party contractors<br>• all personnel are inducted and are aware of their environmental responsibilities |

| Role | Responsibilities |
|---|---|
| | • environmental audits are undertaken on support vessels to verify compliance with the EP<br>• all equipment is maintained and in an operable condition<br>• actions are tracked in an action register, implemented and closed out, including corrective actions identified during audits<br>• waste is managed on all vessels according to this EP.<br>Reporting all environmental incidents to the Operations Manager, HSE & CSR Manager and IMT Leader. |
| HSE Manager (office based) | Reviewing this EP and confirming that all environmental risks have been identified, mitigation strategies are effective and will be undertaken during activities, including emergencies or potential emergencies.<br>Providing and maintaining effective emergency response arrangements for project activities where there is potential environmental risk.<br>Performing incident investigations.<br>Submission of annual environmental compliance report to NOPSEMA. |
| Environmental Advisor (office-based) | Reviewing HSE Management Plans for acceptability and ensuring compliance with this EP.<br>Reporting all incidents to NOPSEMA in accordance with Section 10.8.<br>Co-ordinating and reviewing environmental audits to ensure compliance with the agreed environmental performance outcomes.<br>Providing advice in the event of an oil spill or other environmental incident. |
| HSE Assurance Advisor | NOPSEMA monthly environment reporting of 'recordable incidents'. |
| Eni IMT Leader | Directing the Eni response in the event of an incident.<br>Notifying NOPSEMA of the details of reportable incidents and providing updates on the status of the incident<br>Notifying AMSA in the case of vessel incidents.<br>Communicating with IMT/CMT, government, stakeholders and media in the event of an incident. |
| Eni IMT Duty Officer | Acting as the first point of contact in an incident.<br>Notifying the Eni IMT Leader of the incident. |
| **Offshore personnel (during field management activities)** | |
| Vessel Masters (Contractor) | Ensuring the safe operation of their vessel.<br>Ensuring that the operations on the vessel(s) are in compliance with Contractor's and Eni's HSE systems, regulations and this EP.<br>Ensuring compliance with the Vessel Safety Case.<br>Ensuring all incidents are reported to Eni.<br>Providing support to the Eni's IMT as required.<br>Ensuring all personnel are adequately trained, competent and have the ability to carry out duties as required in this EP.<br>Notifying the Eni Offshore Representative of any incidents arising from operations that do not comply with the performance outcomes and/or standards identified in this EP. |

| Role | Responsibilities |
|---|---|
| | Reports hydrocarbon or chemical spills in accordance with the OPEP. Reports should go to Eni Offshore Rep if present, or relevant Ops department focal point and IMT Duty Manager.<br>Establishing communications with other vessels in the area. |
| Vessel Crew/Offshore support personnel | Undertake HSE and EP induction prior to undertaking any offshore activities.<br>Ensuring all operations aboard vessel(s) are carried out in a manner consistent with this EP.<br>Undertaking operations in accordance with Eni and Contractor HSE systems, including reporting all hazards and incidents to the Vessel Master and Eni Offshore Representative.<br>Report any HSE hazards or incidents to the Vessel Master and the Eni Offshore Representative.<br>Follow housekeeping procedures and work practices.<br>Ensuring all operations aboard the vessel(s) is carried out in a manner consistent with this EP (e.g. report cetacean sightings). |
| Eni Offshore Representative | Notifying the Eni Operations Manager, HSE & CSR Manager should additional environmental risks arise during the activities that have not been identified in this EP.<br>Ensuring all offshore personnel comply with the health, safety and environmental requirements.<br>Providing a daily log of activities and reports reportable and recordable incidents to the Operations Manager.<br>In the event of an emergency, communicating between the support vessel(s) and the Eni IMT in Perth.<br>Implementing and complying with all operational plans, including this EP.<br>Ensuring all monitoring is undertaken in accordance with this EP (Section 10.5) and data is made available to Well Operations Manager.<br>Ensuring adherence to management and mitigation measures outlined to minimise interaction with cetaceans and other marine fauna.<br>Ensuring all whale interaction reports are submitted to Eni Senior Environment Advisor.<br>Investigating hydrocarbon spills, should they occur. |
| **Offshore personnel (during P&A and Subsea Equipment Removal Activities)** | |
| Eni Offshore Representative / Wellsite Supervisor | Reviewing this EP and confirming that all environmental risks have been identified and mitigation strategies are effective and will be undertaken during activities, including emergencies or potential emergencies.<br>Notifying the Eni Operations Manager, HSE & CSR Manager and Decommissioning Interface Manager should additional environmental risks arise during the activities that have not been identified in this EP.<br>Ensuring all offshore personnel comply with the health, safety and environmental requirements.<br>Ensuring all personnel receive the environmental induction prior to the commencement of drilling activities.<br>Providing a daily log of activities and reports reportable and recordable incidents to the Decommissioning Interface Manager. |

| Role | Responsibilities |
|---|---|
| | In the event of an emergency, communicating between the support vessel(s) and the Incident Management Team in Perth.<br>Implementing and complying with all operational plans, including this EP.<br>Ensuring all required plans, audits and reviews are undertaken in accordance with the regulatory requirements and as required by this EP.<br>Implementing and closing out actions in the Campaign Action Register.<br>Ensuring all monitoring is undertaken in accordance with this EP (Section 10.5) and data is made available to Decommissioning Interface Manager.<br>Ensuring adherence to management and mitigation measures outlined to minimise interaction with cetaceans and other marine fauna.<br>Ensuring all whale interaction reports are submitted to Senior Environment Advisor.<br>Notifying NOPSEMA of the details of reportable incidents and providing updates on the status of the incident (Section 10.8).<br>Investigating hydrocarbon spills, should they occur. |
| OIM/Vessel Master | Ensuring full compliance with all applicable navigational safety standards and regulations.<br>Conducting emergency drills.<br>Supervision of IV/MODU and support vessel crew to ensure they are fit for duty and undertaking work only within their area of qualification and training.<br>Monitoring, reporting and taking appropriate action to remedy any IV/MODU and support vessel or equipment defects that may impact on safety and environmental performance of the vessel.<br>Maintaining logs with respect to MARPOL 73/78 regulations.<br>Ensuring that all crew are appropriately qualified, trained and equipped for their roles on the IV/MODU and support vessel.<br>Ensuring IV/MODU, support vessel activities are in compliance with the requirements of this EP.<br>Notification of all IV/MODU and, support vessel related incidents immediately to the Eni Site Representative. |
| IV/MODU and support vessel operators, technicians and crew | Apply operating procedures in letter and in spirit.<br>Follow good housekeeping procedures and work practices.<br>Encourage improvement in environmental performance, wherever possible.<br>Immediately report environmental incidents or spillage of hydrocarbons or chemicals to the support vessel and IV/MODU Vessel Master. |

## 10.3 Training

### 10.3.1 General Arrangements

All staff and contractors working on the Woollybutt Petroleum Activities Program must undertake an induction. The induction programs include:

- Company Induction

- Cultural Awareness Induction.

Training is provided to employees and contractors at Eni as appropriate in order to ensure that individuals have the skills, knowledge and competencies to fulfil their roles.

The Eni approach to training and development is managed under the Eni Training and Development Procedure ENI-HRO-PR-020 which describes the mechanisms by which training and competency are managed and outlines the process by which operations staff are trained. Eni utilises a number of training matrices which define the competency requirements for the roles. For each position, the training matrices indicate the minimum training requirements. An employee's training needs are based upon the matrix and any other training identified by the Line Manager and are recorded within the individuals Personal Development Plan (which outlines training needs on an annual basis).

The training process has been established to ensure that training activities are interactive, effective, competency-based and auditable, in terms of frequency of sessions and attendance of individuals.

Mandatory HSE training for both contractors and employees includes:

- Eni company induction, which includes:
  - Eni Golden Rules
  - HSE IMS
  - substance abuse.
- HSE Standards
- Job Hazard Analysis.

Other HSE training, based on roles and responsibilities, includes:

- dangerous goods awareness
- Management of Change
- Safety Case awareness/legislation
- hazard ID and risk management
- manual handling
- HSE Management System and auditing
- Taproot incident investigation
- HSE for supervisors.

OPEP training requirements are outlined in the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

### 10.3.2 Inductions

All personnel will be required to undertake an environmental induction upon boarding the IV/MODU and support vessels undertaking the Petroleum Activities Program. The

environmental induction will instruct personnel on the issues and management actions identified in this EP as well as their roles and responsibilities with regards to environmental performance. The induction will cover aspects such as:

- environmental regulatory requirements of the activity
- the importance of marine communications regarding any potential interactions with active commercial fishing
- overview of the physical environment
- marine mammal interaction:
  - requirement to record and report sightings of whales and dolphins.
- requirements for waste, segregation, labelling, handling and storage
- requirements for recording waste movements and transfers in Garbage Record Book
- housekeeping and spill prevention:
  - requirements to store chemicals, oils and wastes in designated area
  - location of spill kits.
- spill preparedness and response:
  - alerting procedure and immediate spill response actions.
- environmental incident reporting:
  - requirements for reporting reportable and recordable incidents.

## 10.4 Competency

### 10.4.1 Contractor Selection and Management

All Eni Contractors must have satisfied the general HSE prerequisites in the contractor selection process in accordance with the Eni Contractor HSE Management Procedure ENI-HSE-PR-008 and Eni Contractor HSE specification and requirements ENI-HSE-SP-002.

In addition to this, Eni ensures that contractor personnel receive appropriate training on their HSE responsibilities in connection with Woollybutt field operations and P&A activities. This may be achieved in a number of ways; in particular all workforce, including Contractors, attend HSE Forums which contain a range of HSE awareness presentations and training.

Eni will agree and approve the competencies of the Contractor's technicians before they start work on either Woollybutt field operations or P&A activities. All sub-contractors and specialist services providers that are engaged under the maintenance services contract will similarly be approved by Eni.

### 10.4.2 Verification of Competence

In accordance with the Eni Verification of Competence Procedure ENI-HSE-PR-024, it is mandatory for verification of competency to be undertaken for all personnel who operate

equipment and/or carry out work that requires a High Risk Work Licence. Eni Australia adheres to the National Standard for Licensing Persons Performing High Risk Work 2006. This standard requires persons performing the high risk work of scaffolding, rigging, crane and hoist operations, to hold a High Risk Work Licence.

The procedure requires checks and verifies that the competency already held by personnel is authentic and current and they can safely perform the high risk activity to the required standard.

## 10.5 Monitoring

### 10.5.1 Emissions and Discharge Monitoring

Records relating to the environmental monitoring of planned and unplanned discharges from the activities are listed in Table 10-2. Records will be stored by Eni for at least five years, in accordance with the OPGGS (E) Regulations.

Planned and unpanned discharges are also documented in the daily report for the activity.

**Table 10-2: Environmental monitoring parameters**

| Sources of Risk | Monitoring Criteria | Threshold Limit | Monitoring Method |
|---|---|---|---|
| Atmospheric emissions from combustion engines | Volume of diesel consumed | Not prescriptive limit but principle of ALARP to be applied | Diesel consumption |
| Chemical consumption and discharges from P&A | Volume of chemical consumed | No prescriptive limit but principle of ALARP to be applied | Calculated based on capacity of storage containers |
| Generation and disposal of non-hazardous and hazardous wastes | Volume of solid waste transferred for onshore disposal | No prescriptive limit but principle of ALARP to be applied | Calculated based on capacity of storage containers |
| Discharge of sewage, grey water and putrescible wastes | Estimated volume of sewage, greywater, and mass of food scraps discharged overboard | No prescriptive limit but principle of ALARP to be applied | Estimated based on POB, storage capacity and dimensions of discharge point |
| Discharge of contaminated water | OIW concentration of treated wastewater | ≤ 15 mg/L | Continuous automatic OIW monitor |

### 10.5.2 Activity Monitoring

This occurs from the mobilisation of the Petroleum Activities Program continues until completion of the activity.

For each activity, information is collected for monitoring of compliance to the EPOs, controls, standards and measurement criteria in this EP. At a minimum, evidence identified the measurement criteria in Table 9-2 will be collected and will be used to demonstrate the EPOs and standards are met.

The following systems may be used by Eni and contractors to monitor environmental performance throughout the field management and P&A activities:

- daily vessel or IV/MODU reports during relevant offshore activities
- monthly HSE IV/MODU reports, which include the number of toolboxes/training undertaken, waste, discharges, cetacean sightings
- reports from monitoring detailed in Table 10-2
- contractor inspections and audits
- review of waste management and recycling records
- audits against the EP requirements or other requirements (Section 10.6).

Eni will have the ability to identify compliance issues, identify non-conformance, activity risks and impacts through the Monitoring and Auditing systems and tools described above.

## 10.6 Auditing and Inspection

Compliance verification and auditing processes for the management of HSE is carried out on a number of levels.

At the Eni Australia HSE IMS level, there is a management system element dedicated to the audit and review process and an HSE Auditing Procedure (ENI-HSE-PR-005). This requires that the management system is formally reviewed to ensure ongoing effectiveness and continual HSE improvement. It also ensures that critical HSE processes are in place, for example, the HSE auditing of contractors and sub-contractors, and annual audit of the PTW system.

At a contractor management level, the HSE performance of the Maintenance Services Contractor, and other contractors, is assessed as part of the contractual performance review process. Eni also reserves the right to undertake HSE audits on Contractors and their subcontractors.

At an activity level, HSE monitoring is carried out as part of the execution work scopes. For these activities a project specific plan is prepared that will identify HSE audits, e.g. pre-mobilisation, during activity execution. This process applies to the audit/inspection of vessels and equipment to be utilised in projects (e.g. ROV).

Environmental audits and inspections aim 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.

Eni is certified against the relevant standards, including the OHSA 18001 ISO 14001 and AS/NZ 4801 management systems by a Third-Party verification body.

Further detail regarding specific audits are outlined in below (Sections 10.6.1 and 10.6.2).

### 10.6.1 MODU, Vessel and Intervention Vessel Compliance

Prior to chartering or subcontracting new vessels or MODU, technical evaluation will be undertaken to verify compliance with applicable international rules, regulations and conventions, State and Commonwealth requirements and Eni standards and best practice. New vessels (not previously used by Eni Australia) will be subject to an audit of the complete set of vessel documents and an OVID or IMCA inspection will be requested. Vessels used regularly are required to have a vessel audit completed every 12 months.

Internal auditing is also undertaken for vessels to collect evidence for/assure compliance with Environment Plan commitments. Compliance documentation and evidence is collected on an ongoing basis.

Prior to P&A, the proposed IV/MODU will also be inspected to verify suitability and compliance with Eni requirements, see below Section.

### 10.6.2 Plug & Abandonment Activity Environmental Audits and Inspections

During P&A activities, internal environmental inspections and audits will be conducted to ensure the requirements of this EP are being met. Table 9-2 will be used as a basis for the audit checklist.

The environmental inspection will be conducted by the Offshore HSE Representative or Environmental Advisor and may include verifying:

- environment containment including of chemical storage, spill response equipment and housekeeping
- general IVU environment risks including waste management, drilling fluids oil/water separation
- other relevant measurement criteria applicable during the activity
- any bunkering/transfers between support vessels and IV
- environment equipment survey to be undertaken by a specialist auditor of the contracted IV/MODU against the internationally recognised standards, local legislative requirements, safety and operating standards, equipment manufacturer maintenance and operating specification and accepted oilfield operating and safety practice

- one activity audit during P&A and subsea equipment removal campaign, conducted by an onshore Environment Advisor against the relevant aspects of the EP. Table 10-2 will be used as a basis for the audit checklist.

## 10.7 Non-Conformance, Corrective and Preventative Actions

The incident investigation team makeup is based upon the investigation level. As a general guide, the investigation teams consist of the following:

- Level A: Team may be comprised exclusively of site personnel
- Level B: Team should consist of combined site and office personnel
- Level C: Team should consist of combined site, office and external or HQ experts.

Non-conformances can result from audits. Close-outs of non-conformances are recorded and tracked in an action tracking data base in accordance with ENI-HSE-PR-015 – Corrective Action Tracking and Non-conformance Reporting.

Corrective and preventative actions are raised for all identified hazards and incidents according to ENI-HSE-PR-003 Eni Australia Procedure Hazard and Incident Reporting. Corrective and preventative actions are registered and maintained within the SharePoint system.

Corrective and preventative actions are raised for all identified hazards and incidents according to *ENI-HSE-PR-003 Eni Australia Procedure Hazard and Incident Reporting*. Corrective and preventative actions are registered and maintained within the SharePoint system.

It is the responsibility of Department Managers to ensure that corrective and preventative actions relevant to their area of responsibility are undertaken, tracked and completed. The HSE Manager ensures that all corrective and preventative actions are tracked and that appropriate reminders are communicated to relevant Department Managers.

HSE hazards and incidents are investigated in accordance with *ENI-HSE-PR-025 – Incident Investigation Procedure*. Root cause analysis of incidents is performed to determine the cause and aid identification of corrective actions.

External incident reporting is detailed in Section 10.8.

### 10.7.1 Contractor Management

Breaches of this EP by Eni's contractors can be managed through issuing a formal Non-Conformance Report, in accordance with Procedure Vendor Management (ENI-PRC-PR-001), which links with legal management of the contract and would be initiated by the Eni contract holder. The procedure provides for contractor qualification, evaluation, due diligence, feedback and serious non-performance management. This would apply to any serious or repeated breaches of Eni procedures that could cause environmental harm.

## 10.8 External Reporting

### 10.8.1 Routine Woollybutt Reporting

Routine regulatory reporting requirements for the Woollybutt Petroleum Activities Program are summarised in Table 10-3. The requirements include that Eni develop and submit an annual Environmental Performance Report to NOPSEMA, with the first report submitted within 12 months of the commencement of activities covered by this EP (as per the requirements of Regulation 14(2) (b)).

**Table 10-3: Routine Woollybutt external reporting requirements**

| Report | Recipient | Frequency | Content |
|---|---|---|---|
| Annual Environment Plan Performance Report | NOPSEMA | Should an activity be continuous for 12 months, then a summary environmental performance report will be submitted before the end of this period. | As required by Regulation 14 (2) and 26C the report will assess compliance with the EPOs and EPSs outlined in Section 9.1 of this EP. The reporting period is 1 January to 31 December each year. |
| National Pollutant Inventory (NPI) Report | DoAWE | Annual, by 30 September each year. | Summary of the emissions to land, air and water including those from the facility. Reporting period 1 July to 30 June each year. |
| National Greenhouse and Energy Reporting (NGERS) | Clean Energy Regulator | Annual, by 31 October each year. | Summary of energy use and greenhouse gas emissions including those from the facility. Reporting period is 1 July to 30 June each year. |
| Environment Protection and Biodiversity Conservation Compliance Certificate | DoAWE | Annual, by 1 July each year. | Summary of compliance against conditions of the Approval 2001/365. Reporting period is 1 July to 30 June each year. |
| Monthly summary of recordable incidents | NOPSEMA | Monthly, by 15$^{th}$ of the following month. | Summary of recordable environment incidents. Reporting period is per calendar month. |
| End-of-activity EP Performance Report | NOPSEMA | Within three months of EP completion | Submit to NOPSEMA within three months of EP completion. |

### 10.8.2 Routine Plug & Abandonment and Subsea Equipment Removal Activities Reporting

Routine regulatory reporting requirements for the P&A and subsea equipment removal activities are summarised in Table 10-4. The requirements include that Eni develop and submit an end-of-activity EP Performance Report to NOPSEMA for the P&A and subsea equipment removal activities in accordance with Regulation 26C(c) of the OPGGS(E).

**Table 10-4: Routine external reporting requirements**

| Requirements | Timing | Applicable activities |
|---|---|---|
| Notify the Australian Hydrographic Service (AHS) of the activity commencement date and duration to enable a Notice to Mariners to be issued. | Email the AHS 4 weeks prior to the confirmed activity start date. | P&A & Subsea Equipment Removal |
| Notify AMSA's Joint Rescue Coordination Centre (JRCC) through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings | 24-48 hours before activities commence. | P&A & Subsea Equipment Removal |
| Notify NOPSEMA of the start date of the activity in accordance with Reg. 29 of the OPGGS(E) (submissions@nopsema.gov.au). | Email NOPSEMA at least 10 days prior to the activity starting. | P&A & Subsea Equipment Removal |
| Notify NOPSEMA of the end date of the activity in accordance with Reg. 29 of the OPGGS(E) (submissions@nopsema.gov.au). | Email NOPSEMA within 10 days of the end of the activity. | P&A & Subsea Equipment Removal |
| Notify DMIRS of the start date of the P&A and subsea equipment recovery executions, (petroleum.environment@dmirs.wa.gov.au). | Prior to P&A and subsea equipment recovery. | P&A & Subsea Equipment Removal |
| Notify DMIRS of the end date of the P&A and subsea equipment recovery executions, (petroleum.environment@dmirs.wa.gov.au). | Prior to P&A and subsea equipment recovery. | P&A & Subsea Equipment Removal |
| Submit an end-of-activity EP Performance Report to NOPSEMA, in accordance with Regulation 26C(c) of the OPGGS(E). This reports compliance against each of the performance outcomes and standards as outlined in Section 10 of this EP and:<br>• reportable and reportable incidents, investigation details, corrective actions determined and actioned<br>• monitoring records<br>• inspection/audit outcomes<br>• summary of the activity operations conducted. | Submit to NOPSEMA within 3 months within three months of submission of each Regulation 29(2) end-of-activity notification to NOPSEMA. E.g.<br>3 months of P&A campaign completion. | P&A & Subsea Equipment Removal |
| Provide marine fauna observation data to the DoAWE through their online Cetacean Sightings Application. | Submit to DoAWE within 3 months of activity completion. | Field Management<br>P&A & Subsea Equipment Removal |

### 10.8.3 Incident Reporting (Reportable and Recordable)

#### 10.8.3.1 Reportable Incidents

Under OPGGS(E) Regulation 16(c), 26 & 26A – Reportable Incident, NOPSEMA must be notified of any reportable incidents. For the purposes of Regulation 16(c), a reportable incident is defined as:

- An incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage.

For the petroleum activity, a reportable incident includes:

- Oil spills over 80L in Commonwealth waters;
- An incident that has caused or has the potential to cause environmental damage with a consequence level of Local (3) or above (Table 6-2).

Table 10-5 details the reportable incident requirements.

**Table 10-5: Reportable Incident reporting requirements**

| Requirement/Required Information | Timing | Type | Recipient |
|---|---|---|---|
| The oral notification must contain:<br>• all material facts and circumstances concerning the reportable incident known or by reasonable search or enquiry could be found out<br>• any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident<br>• the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident. | As soon as practicable, and in any case not later than 2 hours after the first occurrence of a reportable incident, or if the incident was not detected at the time of the first occurrence, at the time of becoming aware of the reportable incident. | Oral | NOPSEMA |
| A written record of the oral notification must be submitted. The written record is not required to include anything that was not included in the oral notification. | As soon as practicable after the oral notification. | Written | NOPSEMA<br>NOPTA |
| A written report must contain:<br>• all material facts and circumstances concerning the reportable incident known or by reasonable search or enquiry could be found out<br>• any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident<br>• the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident<br>• the action that has been taken, or is proposed to be taken, to prevent a | Must be submitted as soon as practicable, and in any case not later than 3 days after the first occurrence of the reportable incident unless NOPSEMA specifies otherwise.<br>Same report to be submitted to NOPTA and DMIRS within 7 days after giving the written report to NOPSEMA. | Written | NOPSEMA<br>NOPTA |

| | | | |
|---|---|---|---|
| similar incident occurring in the future.<br>Consider reporting using NOPSEMA's Report of an Accident, Dangerous Occurrence or Environmental Incident form. | | | |

In addition, any injury or death of whales, dolphins or turtles related to the activity (e.g. vessel strike) must be reported immediately to DoAWE, as these species are protected under the EPBC Act.

In addition, as per the Woollybutt OPEP:

- Eni will Contact DPIRD Response Officer within 24 hours after reporting to NOPSEMA an oil spill or discharge of any other pollutant into the environment.
- Make DNP aware of Incidences which occur within an Australian Marine Park (AMP) or are likely to impact on an AMP as soon as possible.

#### 10.8.3.2 Recordable Incidents

Under the OPGGS Act, a 'recordable incident' for an operator of an activity is 'a breach of an environmental performance outcome or standard that applies to the activity and is not a reportable incident'.

Recordable incidents will be reported to the Regulatory Authority as per the OPGGS (E) Regulations (i.e. monthly report of recordable incidents sent by the 15$^{th}$ of the following month), including the submission of 'nil' reports if no environmental incidents have occurred.

## 10.9 Internal Reporting

All environmental incidents, deviations from this EP, or events that do not meet the environmental performance outcomes of the EP will be recorded and reported to Eni, using the Eni Procedure Hazard and Incident Reporting and Investigation (ENI-HSE-PR-003). This includes entering the incident into the incident tracking database, accessible by contractor supervisors and the Eni personnel.

Some examples of environmental incidents that need to be reported to Eni include:

- the uncontrollable escape or ignition of petroleum or any other flammable or combustible material causing a potentially hazardous situation
- spills of hydrocarbons, hydraulic fluids or any other chemicals, of any volume
- unplanned releases of gas
- overboard disposal of solid waste (accidental or intentional)
- loss of equipment to the ocean (dropped objects)
- incorrect disposal of wastes onshore by waste contractors.

## 10.10 Knowledge-Sharing and Health, Safety and Environment Communication

HSE communications include both internal communication to employees and external communication to stakeholders, and is managed in accordance with ENI-HSE-PR-016 Procedure HSE Communications, Consultation and Participation. Emergency Communications are described in the Emergency Response Plan (000036_DV_PR.HSE.0675.000).

HSE commitments and obligations are established, recorded, maintained, communicated and managed within Eni in accordance with ENI-HSE-PR-006 Procedure Maintaining Knowledge of HSE Commitments and Obligations.

### 10.10.1 Internal Communications with Eni Exploration and Production Division

Regular communications from the Eni Upstream Division regarding HSE matters include:

- guidelines for the establishment of annual HSE objectives
- requests of monthly, quarterly and annual reports
- documentation relevant to the establishment of budgetary provisions for HSE activities
- highlighted actions to improve certain objectives
- reports on HSE audits that may have taken place
- incident reporting and investigation and lessons learnt
- publication of HSE articles in the Company's publications
- distribution of the Policy, Procedures and other documents of the HSE Management System
- publication of Eni's annual Sustainability Report
- any other communication specific to a particular HSE event.

Eni Australia regularly communicates HSE performance information to Eni's Upstream Division, through:

- monthly, quarterly and annual reports
- accident/incident reports and investigation
- Audit and Corrective Action close out status
- HSE Qualitative Report (Four Year Plan) (ENI-HSE-RP-011) and HSE Annual Plan (ENI-HSE-PL-031).

### 10.10.2 Internal Eni Australia Communications

Typical examples of key internal Eni communications are:

- Weekly Management Meetings
- Activity Morning Calls

- Back-to-back Roster Handovers
- HSE Meetings
- Pre-start Meetings
- Safety Initiatives and Communications
- Management Safety Visits.

### 10.10.3 Non-Verbal Communication

In addition to the meetings described above there are a number of non-verbal means of communicating HSE issues within Eni, including:

- Eni Intranet websites
- emails
- HSE Noticeboards.

The Eni Intranet site has a HSE page which contains links to:

- HSE IMS
- reporting forms
- incident and crisis management documentation
- Woollybutt Safety Case documentation
- Woollybutt Field Management and P&A Environmental Plan.

Emails are regularly used to communicate HSE issues within Eni. Typically, these would be:

- HSE Alerts. HSE Alerts are specific alert notices that arise from Hazard and Incident Reports, and are typically only considered for high potential incidents. The HSE Manager will decide on whether to issue an HSE Alert to inform the wider workforce.
- HSE Bulletins. Notices on HSE topics that need to be raised in the workforce can be done so using HSE Bulletins. They can focus on an HSE theme or just raise a specific item of interest. The HSE Manager coordinates the development of new HSE Bulletins.

HSE Noticeboards are present in all Eni offices and plants. They function to inform the workforce about HSE issues. Regular items which are placed on the HSE noticeboards include:

- HSE Commitment Statement
- incident statistics
- Incident Descriptions
- audit reports
- Hazard Cards (for reporting of hazards).

### 10.10.4 External Communications

External communication on HSE matters is typically made to a range of recipients including Governments (including government agencies and regulators), community groups, NGOs, customers, industry bodies, and the media (Table 10-4)

**Table 10-6: External communication summary**

| External communication | Details on communication level |
|---|---|
| Government | Eni Australia's HSE communications with government authorities is undertaken according to legislative requirements and guidelines, or where none exist, best practice. Generally, HSE communications between Eni Australia and relevant government departments are carried out through the Eni Operations and HSE Departments. Records of key communications are maintained by the Eni relevant Department.<br>The Managing Director may address communications with government bodies in certain circumstances (e.g. major accident investigation), in which case Eni upstream may also become involved. |
| Non-Government Organisations and Community Groups | HSE communication and consultation with NGOs and Community Groups will generally be coordinated by the HSE Department. Technical HSE communications to NGOs and Community Groups may be handled via an HSE specialist assigned to the particular project.<br>Technical HSE communications may be undertaken by an HSE specialist. |
| Customers | Eni Australia actively engages with its customers, to ensure there is a common understanding of HSE issues as they are related to the supply of products. HSE communication with customers will generally be coordinated by the relevant department(s) with advice from the HSE Department. |
| Business and Industry Organisations | Eni is a member of the APPEA and the WA and NT Chambers of Commerce. Interaction with the business community also occurs in Eni's day to day business. Industry forums, such as the APPEA conferences and South East Asian & Australian Offshore Conference (SEAAOC) allow Eni to further communicate HSE aspects.<br>HSE communication with Unions is coordinated by the Human Resources Department with advice from the HSE Department. |
| Media | Media liaison in relation to crisis and emergency situations are managed in accordance with the Eni Crisis Management Plan. |
| Public HSE Reporting | Eni Australia, through its corporate head company Eni Upstream, communicates externally to the public about Eni's significant HSE aspects through a public Sustainability Report. This report contains information on the HSE performance of Eni Divisions and Business Units, including Eni Australia. The Sustainability Report enables Eni to share its vision and commitment to sustainable development with its staff, all relevant stakeholders and the public. It is available on the Eni internet site (www.eni.it). |

## 10.11 Management Review and Improvement

The HSE IMS is reviewed on a minimum five-yearly basis in association with risk assessment outcome and incident reviews for required changes. This review includes the review of any triggers requiring update to the HSE IMS (as detailed below), as well as general business planning outcomes and assessments of the effectiveness of performance standards. The review also documents actions and requirements for items including the review and update of procedures and systems as identified in the HSE IMS review.

The HSE IMS review also incorporates feedback from the public and Regulators with respect to performance and expectations.

The changes that may initiate review of the HSE IMS include:

- legislative changes, including changes to regulatory regime (e.g. modification to Pipeline Licence conditions)
- advancement in technology
- significant changes arising from hazard/event investigations to prevent recurrence
- significant changes due to complaints and changing community expectations
- significant changes/improvements identified from various risk assessments, including ongoing HAZOPs, HAZIDs, JHAs and other hazard identification processes
- significant changes in activities (methodology in work processes)
- significant changes in organisation structure, and business policies and objectives
- significant changes resulting from monitoring of HSE performance KPIs
- remedial actions from audits.

### 10.11.1 HSE Management Review

A formal management review is conducted yearly to assess overall implementation of the HSE IMS as per the Procedure HSE Management Review (ENI-HSE-PR-014). Areas in need of reinforcement are identified and as a result the elements of the system that need to be reinforced are highlighted. Action plans and responsibilities are agreed to improve risk management and the overall HSE performance of Eni Australia.

This includes reviews of the:

- changes in:
  - external & internal issues that are relevant to the environmental management system
  - the needs and expectations of interested parties, including compliance obligations
  - significant environmental aspects
  - risks and opportunities.

- information on environmental performance, including trends in:
  - nonconformities and corrective actions
  - monitoring and measurement results
  - fulfilment of compliance obligations
  - audit results.
- adequacy of resources
- relevant communication(s) from interested parties, including complaints
- opportunities for continual improvement
- changes in legislation or guidance (e.g. current requirements for Australian Marine Parks)
- advances in relevant environmental technology and new scientific information.

Reviews of oil spill arrangements and testing are carried out in accordance with the Woollybutt OPEP (000105_DV_PR.HSE.1045.000).

### 10.11.2 Continuous Improvement

Continuous environmental improvement within of performance within Eni is driven by a number of mechanisms, these include:

- corporate initiatives
- auditing (see Section 10.6)
- Hazard and Incident Reporting (see Section 10.8.3 and Section 10.7)
- incident investigation (see Section 10.7)
- HSE Data monitoring and reporting (See Section 10.5).

Reporting of incidents and the monitoring of this data draws management attention to trends resulting from potential weaknesses. Thorough investigation of incidents can be used to alert management to system failures.

HSE auditing can uncover system failures before incidents occur. Auditing reporting and monitoring can notify management of a deficiency in the HSE IMS or of a problem with implementation of the HSE IMS.

Eni is responsible for implementing an ongoing process to identify and assess suitable measures for improving plant reliability and availability, plant safety levels and for reducing maintenance activities workload and material costs.

## 10.12 Management of Change and Reviews of this Environment Plan

Change is managed in accordance with the Eni Australia Management of Change (MOC) Procedure [ENI-HSE-PR-002].

The MOC procedure applies to changes in operational assets, systems, processes, operations, products, organisation and staffing that have the potential to alter hazard

or risk levels, or affect environmental outcomes including compliance with applicable laws or standards or to significantly affect a stakeholder involved with the above items. Standard modification or changes that occur within existing work processes (such as Permit to Work system) or are of a routine nature are not included in this procedure. Descriptions of changes where this procedure applies are listed in Table 10-7.

**Table 10-7: Example of changes (HSE critical) to which MOC procedure applies**

| Type of change | Explanation |
|---|---|
| Changes to design or operating conditions | • Alteration to critical design or key assumptions operating data.<br>• Change in composition and/or rate of feed or products.<br>• Alternative type or manufacturer of workplace substances.<br>• Operating outside design or manufacturer's recommendations. |
| Deviations from critical Procedures | Deviations from:<br>• Work Management Procedures<br>• Critical Operating Procedures<br>• Critical Maintenance Procedures. |
| Critical non-routine operations | Critical non-routine operations, with potential for significant risk (not covered by an existing critical procedure) managed with special preparation and procedures to ensure positive control. |
| Statutory-approved processes | Changes to operations, drilling or seismic programs approved through Safety Cases, Environment Plans or Oil Spill Contingency Plans, or other statutory processes. |
| Changes in Engineering | Where equipment being replaced is not 'like for like'.<br>Design changes for improvements in equipment/process. |
| Major plant and equipment tests | Includes tests which could:<br>• result in operating outside normal operating limits<br>• adversely affect product quality<br>• breach regulatory limits<br>• require isolation of safety or shutdown systems<br>• result in major equipment or plant shutdown<br>• create an additional hazard or increase in risk<br>• cause a change in risk profile. |
| Software changes | Permanent changes to alarm and shutdown settings.<br>Permanent changes to control software, logic or configuration changes. |
| Systems changes | Changes to existing work systems and procedures that manage HSE risks or hazards. |
| People/organisation changes | Changes, introduction of removal of key personnel, work groups or functions within the business. |

Potential changes in risk originating from external factors may lead to EP reviews. Changes which may lead to an EP review may include:

- those concerning the scope of the activity description (Section 3)
- advances in technology

- new scientific information
- changes in understanding of the environment (e.g. advice from on species protected under EPBC Act and current requirements for Australian Marine Parks (Section 4.5.1)
- potential new advice from external stakeholders (Section 5). These will be reviewed in regard to Regulation 17 of the OPGGS (E) Regulations.

External factors which may lead to EP review are identified through a number of means including:

- internal knowledge sharing and HSE communication (Section 10.10)
- internal communications (Section 10.10.1)
- HSE Management Review (Section 10.11.1)
- non-verbal communications (Section 10.10.3)
- external communications (Section 10.10.4).

If a review of the activity and the environmental risks and impacts do not trigger a requirement for a revision, the change is considered minor. Minor change will be considered a 'minor revision', under Regulation 17 of the OPGGS (E) Regulations. 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 will be tracked by Eni through its document change register on SharePoint and incorporated during internal reviews.

In accordance with the requirements of Regulation 19 of the OPGGS (E) Regulations, Eni will submit a proposed revision to this EP to NOPSEMA at least 14 days before the end of each period of 5 years commencing on the day on which the original and subsequent revisions of the EP is accepted under Regulation 11 of the OPGGS (E) Regulations.

Regulation 23 Petroleum Pipelines (Environment) Regulations 2012 requires the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) to be revised every two and a half years.

Management review (Section 10.11) may trigger a review of the EP and internal reviews will address matters such as the overall design and effectiveness of the EP, progress in environmental performance, changes in environmental risks, changes in business conditions, and any relevant emerging environmental issues or change in understanding of the environment (e.g. protected matters requirements). Reviews may also trigger adoption or reconsideration of once rejected controls within the EP.

This EP will be revised and resubmitted to NOPSEMA:

- if/when an environmental inspection/audit (see Sections 10.6.1 and 10.6.2) finds significant breaches of the EP requirements
- if any significant new environmental risk or effect, or significant increase in an existing environmental risk or effect occurs that is not provided for in the existing EP as required by OPGGS(E) Regulation 17.

### 10.12.1 Review of Impacts, Risks and Controls Across the Life of the EP

A review of the EP will be undertaken prior to P&A activities to ensure that risks remain ALARP and are pertinent to the activity. This will include review of impacts, risks and controls. Any relevant findings or information gathered from other Eni activities under this EP will be taken into account.

Post review of the EP, the findings may identify new impacts or trigger a review impacts and risks associated with upcoming activities (both included within this EP or within other EPs). The process will identify or review controls to ensure impacts and risks remain/are reduced to ALARP and acceptable levels. New controls may be added that were previously excluded as part of the ALARP assessment. Any changes will be managed by the MOC process.

## 10.13 Dangerous Weather Response

Tropical cyclones and other storm conditions have the potential to cause damage to personnel, the environment and equipment. ENI-HSE-ST-031 Standard Adverse Weather includes procedures for preparing for and responding to cyclone events. The response goal during a cyclone event is to ensure protection of personnel, the environment, equipment and the subsea equipment integrity, and the corresponding priorities include:

- securing any subsea equipment in the process of being moved
- vessel(s) sail away to sheltered location
- evacuating personnel.

Eni utilises experienced weather service providers such as the Bureau of Meteorology (BOM) and Weatherzone to provide up to date location specific forecasts. Eni utilises specifically tailored services for its real-time forecasting and severe weather forecasting capabilities. They advise key Eni personnel of any severe weather or potential severe weather to support our operations and strategic planning. The Decommissioning Coordinator must ensure that he/she receives email notification of cyclones from the provider. This includes:

1. Tropical Cyclone seven day outlook

2. Tropical Cyclone forecast.

The IV/MODU and support vessels will receive daily forecasts from a weather forecast provider. In the event that the cyclone (or severe weather) is forecast and it has the potential to affect the activities, the cyclone management plan will be actioned. If required, vessels can transit from the proposed track of the cyclone (or severe weather).

## 10.14 Oil Pollution Emergency Plan

### 10.14.1 Overview

The environmental risk assessment for field management and P&A activities identified four potential spill scenarios:

- subsea release of Woollybutt crude due to loss of well control during P&A activities – volume 10,589 m³ (Section 8.5)
- subsea release of Woollybutt crude due to corrosion and valve failure during field management activities – volume 14,490.5 m³ (Section 8.6)
- vessel collision resulting in fuel tank rupture and release of diesel – (volume of largest fuel tank-maximum volume 500 m³) (Section 8.7)
- outboard leaks of hydraulic fluids (e.g. ROVs) hydraulic fluid spill – maximum volume of 5 L (Section 8.8).

The requirements of the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) and the location of the information required is given in Table 10-8.

**Table 10-8: OPEP requirements**

| Regulation | Description | Location |
|---|---|---|
| 14 (8) | The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan. | Woollybutt OPEP (000105_DV_PR.HSE.1045.000)) |
| 14 (8AA) | The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following: | - |
| (a) | the control measures necessary for timely response to an emergency that results or may result in oil pollution; | Woollybutt OPEP (000105_DV_PR.HSE.1045.000) |
| (b) | the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability | Woollybutt OPEP (000105_DV_PR.HSE.1045.000) |
| (c) | the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met; | Woollybutt OPEP (000105_DV_PR.HSE.1045.000) |
| (d) | the arrangements and capability in place for monitoring oil pollution to inform response activities. | Woollybutt OPEP (000105_DV_PR.HSE.1045.000) |
| 14 (8A), (8B0 and (8C) | The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity. | Section 10.14.2 |
| 14(8D) | The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that:<br>(a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and<br>(b) is sufficient to inform any remediation activities. | Section 8.9 as well as Section 3.5 of the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) |
| 14(8E) | The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response. | Section 2 of the Woollybutt OPEP (000105_DV_PR.HSE.1045.000) |

### 10.14.2 Arrangements for Testing the Oil Pollution Emergency Plan

Arrangements for testing the response arrangements are summarised in Table 10-9.

**Table 10-9: Testing requirements and arrangements**

| OPGGS(E)Requirements | Description |
|---|---|
| As per Regulation 14(8B) of the OPGGS(E)R 2009, the arrangements for testing the response arrangements must include: | |
| A statement of the objectives of testing | SOPEP testing provides an opportunity for crew to gain confidence in using onboard spill equipment and implementing incident response procedures, increase efficiency in the event of an emergency, review the efficiency of procedures and detect any failures in equipment. |
| | Testing will be organised in accordance with the Professional Operating Instruction for Planning and Execution of Emergency Drills, including setting an objective for the emergency drill.<br>Testing oil spill preparedness is carried out against defined oil spill preparedness performance objectives and standards which are provided in the OPEP.<br>Testing of will also ensure that the timings presented in the OPEP are able to be met, that contracts are in place and contractors have maintained their response capabilities as per the contract. |
| A proposed schedule of tests | Regular drills and exercises (three monthly) are carried out on all vessels in line with IMO/SOPEP. These drills include, but are not limited to, spill response, collision and grounding, fire and explosion and helicopter emergency. |
| | A desk based OPEP exercise will occur prior to the P&A activity commencing. |
| Mechanisms to examine the effectiveness of response arrangements against the objectives of testing | In particular:<br>• issues raised (if any) will be described in daily report<br>• weekly checklist ensures that spill monitoring equipment is in place and fully stocked<br>• rudiments described for the review of the EP and OPEP<br>• requirements described for testing below. |
| Mechanisms to address recommendations arising from tests | As mentioned, issues raised (if any) resulting from testing will be described in daily report.<br>The Vessel Master is made aware that the change is managed to the OPEP and this EP through MoC described in Section 10.12. |
| As per Regulation 14(8C) of the OPGGS(E)R 2009, the proposed schedule of tests must provide for the following: | |
| Testing the response arrangements when they are introduced | A SOPEP drill onboard all vessels will be carried out prior to the commencement of the activity. |
| | A desk based OPEP exercise will occur prior to the P&A activity commencing. |

| OPGGS(E)Requirements | Description |
|---|---|
| Testing the response arrangements when they are significantly amended | Any changes to the OPEP or EP will be introduced through the MOC described in Section 10.12. Where changes reasonably affect the arrangements in place, the changed arrangements will be tested prior to finalising the MoC. |
| Testing the response arrangements not later than 12 months after the most recent test | SOPEP drills will occur every three (3) months. |
| | A desk based OPEP exercise will occur prior to the P&A activity commencing. |
| If a new location for the activity is added to the environment plan after the response arrangements have been tested, and before the next test is conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan | No activity will occur outside the Operational Area described in Section 3. |
| If a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational | Not applicable. |

# 11 FINANCIAL ASSURANCE

Eni has calculated the level of Financial Assurance required for the activities described in this Environment Plan in accordance with the 2018 APPEA Method.

# 12 REFERENCES

ABARES (2014). Fishery status reports 2013-14, researched by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), October 2014. Available at: http://data.daff.gov.au/data/warehouse/9aam/fsrXXd9abm_/fsr13d9abm_20141023/00_FishStatus2014_1.3.0_LR.pdf. Accessed 16 August 2015.

ACONA (2019.) Technical Note: Heimdal jacket removal – trawl impact risk assessment, Rev 01, dated 24 June 2019. Prepared for Equinor ASA. Available https://www.equinor.com/content/dam/statoil/documents/impact-assessment/heimdal/equinor-heimdal-trawl-impact-risk-acona-2019-06-24.pdf. Accessed 11 May 2021.

AMSA (2015). Technical guidelines for preparing contingency plans for MARINE AND COASTAL FACILITIES. Available online at https://www.amsa.gov.au/sites/default/files/2015-04-np-gui012-contingency-planning.pdf

Australian Bureau of Agricultural Resource Economics and Science (ABARES) (2015) Fishery status reports 2015, researched by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), October 2015. Available at: http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrdl/DAFFService/display.php?fid=pb_fsr15d9abm_20151030.xml. Accessed 16 February 2015.

Australian Bureau of Agricultural Resource Economics and Science (ABARES) (2017) Fishery status reports 2017, researched by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), 2017. Available at: http://apo.org.au/system/files/112431/apo-nid112431-441636.pdf. Accessed 10 September 2018.

Australian Fisheries Management Authority, (AFMA) 2010. Annual status report: southern bluefin tuna fishery 2010. Australian Fisheries Management Authority, Canberra.

Australian Fisheries Management Authority (AFMA) (2008). North West Slope Trawl Fishery Data Summary. Australian Fisheries Management Authority, Canberra.

Australian Maritime Safety Authority (AMSA) (2015). Technical guidelines for preparing contingency plans for marine and coastal facilities.

Apache Energy Limited (AEL) (2010). Halyard Development EPBC Referral. Viewed online July 2012: <http://www.environment.gov.au/cgi-bin/epbc/epbc_ap.pl?name=current_referral_detail&proposal_id=5611>.

APASA—see Asia-Pacific Applied Science Associates.

APPEA (2008). Code of Environmental Practice. Australian Petroleum Production and Exploration Association, Canberra, Australian Capital Territory.

APPEA (2014) Method to assist titleholders in estimating appropriate levels of financial assurance for pollution incidents arising from petroleum activities. December 2014.

APPEA, 2005. A compilation of recent research into the marine environment. Australian Petroleum Production and Exploration Association. Canberra, Australian Capital Territory.

Arkive 2016, Giant Manta Ray (Manta birostris) http://www.arkive.org/giant-manta-ray/manta-birostris/ viewed online: 21 September 2016.

Asia Pacific Applied Science Associates (APASA) (2012). Woollybutt Field Decommissioning Hydrocarbon Spill Modelling Study.

Asia Pacific Applied Science Associates (APASA) (2021). Woollybutt Quantitative Spill Risk Assessment Report. March 2021. MAW1004J.000

Arveson, P. T., and Vendittis, D. (2000). "Radiated noise characteristics of a modern cargo ship," J. Acoust. Soc. Am., 107(1), 118-129

Atteris (2020). Woollybutt decommissioning. Inspection criticality review. 20-019-103-RP-002 007104.00.P.Z.RV.A0004_REV01

Atteris (2021). Woollybutt Degradation Assessment (March 2021). Report number: 20-019-201-RP-001

Australian Maritime Safety Authority (AMSA) (2012). AIS Point Density Analysis. North West Cape to Dampier, Western Australia. Prepared March 2012.

Australian Fisheries Management Authority (AFMA). (2012). Western Tuna and Billfish Fishery. Viewed online June 2012: http://www.afma.gov.au/managing-our-fisheries/fisheries-a-to-z-index/western-tuna-and-billfish-fishery/.

Bhagwan Marine (2016). Woollybutt Survey Close Out Report, ENI Doc. No. 007104.00.P.Z.X0022_00, Rev B, Sep 2019.

Bhagwan Marine (2020). Woollybutt Survey Close Out Report, ENI Doc. No. BMSD-2037-COR-001, Rev A, Feb 2020.

Baker, C., Potter, A., Tran, M. and Heap, A. (2008). Sedimentology and Geomorphology of the Northwest Marine region. A Spatial Analysis. Geoscience Australia Record 008/07.

Baker, C.S., and Herman, L.M. (1989). Behavioural responses of summering humpback whales to vessel traffic: experimental and opportunistic observations. Final Report to the National Park Service. US Department of the Interior, Anchorage, AK.

Bannister, J.L. (1979-2005). Annual Reports on aerial surveys of Southern Right Whales on the southern Australian coastline. Western Australian Museum, Perth.

Bannister, J.L., C.M. Kemper and R.M. Warneke (1996). The Action Plan for Australian Cetaceans. [Online]. Canberra: Australian Nature Conservation Agency. Available from:

http://www.environment.gov.au/coasts/publications/cetaceans-action-plan/pubs/whaleplan.pdf.

Bennelongia (2009) Ecological Character Description for Roebuck Bay. Report to the Department of Environment and Conservation. Bennelongia Pty Ltd, Jolimont.

Bennett, M., and Bansemer, C. (2004). Investigations of Grey Nurse Shark in Queensland to fulfil actions under the Recovery Plan for Grey Nurse Shark (*Carcharias taurus*) in Australia regarding impact of divers, and establishment of a photographic database to improve knowledge of migratory movements, localised site movements and estimation of bycatch. Prepared for Department of Environment and Heritage by School of Biomedical Sciences, The University of Queensland, Brisbane.

Black, K.P., G.W. Brand, H. Grynberg, D. Gwythe, L.S. Hammond, S. Mourtikas, B.J. Richardson and J.A. Wardrop (1994). Production Activities. Pages 209-407 In: J.M. Swan, J.M. Neff, and P.C. Young, eds., Environmental Implications of Offshore Oil and Gas Development In Australia Findings of an Independent Scientific Review. Australian Petroleum Production and Exploration Association, Canberra, Australia.

BOM—see Bureau of Meteorology.

Bonn Agreement Aerial Surveillance Handbook (BAASH) (2004). Annex A: The Bonn Agreement Oil Appearance Code. Online resource, accessed on 27 February 2012 at: http://www.bonnagreement.org/eng/doc/Aerial%20Surveillance%20Handbook%202004%20-%20English%20version.pdf.

Bruce, B.D., Stevens, J.D., Malcolm, H., 2006. Movements and swimming behaviour of white sharks (Carcharodon carcharias) in Australian waters. Marine Biology 150: 161-172.

Bureau of Meteorology (2016). Climate statistics for Australian locations (Pirlangimpi). Australian Government, Canberra. Viewed September 2016 at: <http://www.bom.gov.au/climate/averages/tables/cw_005058.shtml>.

Cailliet, G.M., Cavanagh, R.D., Kulka, D.W., Stevens, J.D., Soldo, A., Clo, S., Macias, D., Baum, J., Kohin, S., Duarte, A., Holtzhausen, J.A., Acuña, E., Amorim, A. & Domingo, A. (2009). Isurus oxyrinchus. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 16 June 2012.

CALM and MPRA. (2005). Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005-2015 (Management Plan No. 52). Department of Conservation and Land Management and Marine Parks and Reserves Authority. Perth.

Carr, A. & S. Stancyk (1975). Observations on the ecology and survival outlook of the Hawksbill Turtle. Biological Conservation. 8:161-172.

Cavanagh R, D., P.M. Kyne, S.L. Fowler, J.A. Musick & M.B. Bennett, eds. (2003). The Conservation Status of Australian Chondrichthyans: Report of the IUCN Shark Specialist Group Australia and Oceania Regional Red List Workshop. Brisbane, Queensland: The University of Queensland, School of Biomedical Sciences.

Centre for Environment, Fisheries and Aquaculture Science (CEFAS). (2016). Offshore Chemical Notification Scheme (OCNS). Chemical Hazard and Risk Management (CHARM). Online resource, accessed on 19 September 2016 at: https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/.

Champion Technologies, (2010). Safety Data Sheet. Hydrosure 0-3670RD. Revision Date 30/11/2010.

Chatto, R., and B. Baker (2008). The distribution and status of marine turtle nesting in the Northern Territory-Technical Report 77/2008. [Online]. Parks and Wildlife Service, Department of Natural Resources, Environment, The Arts and Sport. Northern Territory Government. Available from: http://www.nt.gov.au/nreta/publications/wildlife/science/pdf/marine_turtle_nesting.pdf.

Chevron Australia Pty Ltd (Chevron Australia) (2005). Draft Environmental Impact Statement/Environmental Review and Management Program for the Proposed Gorgon Development. Chevron Australia Pty Ltd, Perth, WA.

Chevron Australia, (2009). Gorgon Gas Development and Jansz Feed Gas Pipeline Long-term Marine Turtle Management Plan. Chevron Australia Pty Ltd, Perth, WA.

Collette, B.B., and Nauen, C.E. (1983). FAO species catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date. FAO Fisheries Synopsis (125) Vol. 2: 137 p.

Commonwealth of Australia (2012). Marine bioregional plan for the North-west Marine Region, prepared under the *Environment Protection and Biodiversity Conservation Act* 1999, Department of Sustainability, Environment, Water, Population and Communities.

Commonwealth of Australia (2015). Blue whale conservation management plan. A Recovery Plan under the *Environmental Protection and Biodiversity Conservation Act 1999* 2015-2025. Department of the Environment.

Compagno, L.J.V. (2001). Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Vol. 2. Bullhead, mackerel and carpet sharks (Heterodontiformes, Lamniformes and Orectolobiformes). FAO species catalogue for fisheries purposes. No. 1. Vol. 2. FAO, Rome.

Cogger, H.G. (2000). Reptiles and Amphibians of Australia – 6th edition. Sydney, NSW: Reed New Holland.

Currie, D.R., Isaacs, L.R. (2004). Impact of exploratory offshore drilling on benthic communities in the Minerva gas field, Port Campbell, Australia.

CALM and MPRA (2005) Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005-2015. Department of Conservation and Land Management (CALM) and Marine Parks and Reserves Authority (MPRA). Western Australia.

Davis, T.L.O., Jenkins, G.P., and Young, J.W. (1990). Diel patterns of vertical distribution in larvae of southern Bluefin *Thunnus maccoyii*, and other tuna in the East Indian Ocean. Marine Ecology Progress Series Vol. 59: 63-74.

Deepwater Horizon Natural Resource Damage Assessment Trustees (2016). Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. <www.gulfspillrestoration.noaa.gov>. National Oceanic and Atmospheric Administration, Silver Spring, MD.

DEWHA (Department of the Environment, Water, Heritage and the Arts) (2008) The South-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the South-West Marine Region. [Online] Canberra: DEWHA Available from: http://www.environment.gov.au/coasts/mbp/publications/south-west/pubs/sw-profile-full.pdf.

Department of Agriculture (2013), Australian Ballast Water Requirements – Version 6. Australian Government. <http://www.agriculture.gov.au/biosecurity/avm/vessels/biosecurity-concerns/ballast/australian-ballast-water-management-requirements-version6 > viewed online: September 30 2016.

Department of Environment and Conservation (DEC). (2006). Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves 2007-2017. Government of Western Australia, Perth, Western Australia.

Department of Parks and Wildlife (DPaW). Viewed online March 2019.

DEC 2012a. Montebello Islands Marine Park. Viewed online June 2012: http://www.dec.wa.gov.au/component/option,com_hotproperty/task,view/id,149/Itemid,1584/.

DEC 2012b. Barrow Island Marine Park. Viewed online June 2012: http://www.dec.wa.gov.au/component/option,com_hotproperty/task,view/id,116/Itemid,755/.

Department of the Environment and Energy (DoEE) (2016). World Heritage Places – The Ningaloo Coast – World Heritage Values. Australian Government. <https://www.environment.gov.au/heritage/places/world/ningaloo/values> Viewed online 15 September 2016.

Department of the Environment and Energy (DoEE) (2016b). Biologically important areas of regionally significant marine species. <https://www.environment.gov.au/marine/marine-species/bias > viewed online: 18 September 2016.

Department of the Environment and Energy (DoEE) (2016c). Whale shark (Rhincodon typus). <https://www.environment.gov.au/marine/marine-species/sharks/whale-shark> viewed online: 20 September 2016.

Department of the Environment (DotE) (2016). EPBC Act Protected Matters Report. Australian Government. Report Created 15/09/16 16:52:00, Commonwealth of Australia.

Department of the Environment (DotE) (2016b). Balaenoptera borealis in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016c). Balaenoptera physalus in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016d). Balaenoptera edeni in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016e). Orcinus orca in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016f). Physeter macrocephalus in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016g). Sousa sahulensis in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016h). Natator depressus in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016i). Eretmochelys imbricata in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016j). Dermochelys coriacea in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016k). Macronectes giganteus in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 20 Sep 2016.

Department of the Environment (DotE) (2016n). Numenius madagascariensis in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 21 Sep 2016.

Department of the Environment (DotE) (2016p). Carcharodon carcharias in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 21 Sep 2016.

Department of the Environment (DotE) (2016q). Caretta caretta, in Species Profile and Threats Database, Department of the Environment, Canberra, Available from: http://www.environment.gov.au/sprat. Accessed Wed, 21 Sep 2016.

Department of the Environment (DotE) (2016r). Carcharias taurus (west coast population) in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Thu, 29 Sep 2016.

Department of the Environment (DotE) (2016s). Pristis zijsron in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Thu, 29 Sep 2016.

Department of the Environment (DotE) (2016t). Pristis clavata in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Thu, 29 Sep 2016.

Department of the Environment (DotE) (2016u). Ardenna carneipes in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Thu, 29 Sep 2016.

Department of the Environment (DotE) (2016v). Calidris ferruginea in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Thu, 29 Sep 2016.

Department of the Environment (2016w). Sterna dougallii in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Thu, 29 Sep 2016.

Department of Environment and Heritage (DEWHA) (2004a), Assessment of the Pilbara Trap Managed Fishery, Australian Government, Canberra.

Department of Environment and Heritage (DEWHA) (2004b), Assessment of the Western Australian Mackerel Fishery, Australian Government, Canberra.

Department of Fisheries (DoF) (2004), Application to the Department of Environment and Heritage (DEH) on the Pilbara Fish Trawl Interim Managed Fishery. Government of Western Australia.

Department of Fisheries (DOF) 2010. A bycatch action plan for the Pilbara Fish Trawl Interim Managed Fishery: Fisheries Management Paper No. 244, Perth WA. ISSN 0819-4327.

Department of Fisheries (DoF). (2011). State of the Fisheries and Aquatic Resources Report. 2010/11. Department of Fisheries, Western Australia.

Department of Fisheries (DoF) (2014) Status reports of the fisheries and aquatic resources of Western Australia 2013/14; State of the fisheries. Report prepared by Fletcher, WJ and Santoro, K (eds) for the Department of Fisheries (DoF), Western Australia.

Department of Sustainability, Environment, Water, Population and Communities (SEWPaC). (2012a). Australian National Shipwreck Database. Australian Government, Canberra. Viewed online October 2011: <http://www.environment.gov.au/heritage/shipwrecks/database.html>.

Dow Piniak WE (2012) Acoustic Ecology of Sea Turtles: Implications for Conservation. In Marine Science and Conservation Duke University. pp 136.

SEWPaC (2012b). Historic Shipwrecks. Viewed online June 2012: <http://www.environment.gov.au/heritage/shipwrecks/index.html>.

SEWPaC (2012c). Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the *Environment Protection and Biodiversity Conversation Act 1999* 2011 – 2021.

Det Norske Veritas Germanischer Lloyd (2017), Cathodic Protection Design, DNVGL-RP-B401, Jun 2017.

Di Toro, DM, McGrath, JA & Stubblefield, WA (2007). 'Predicting the toxicity of neat and weathered crude oil: toxic potential and the toxicity of saturated mixtures', Environmental Toxicology and Chemistry, vol. 26, no. 1, pp. 24–36.

Double MC, Jenner KCS, Jenner M-N, Ball I, Laverick S, Gales N (2012). Satellite tracking of pygmy blue whales (*Balaenoptera musculus brevicauda*) off Western Australia. Final report to the Australian Marine Mammal Centre, Tasmania, May 2012.

Double MC, Andrews-Goff V, Jenner KCS, Jenner M-N, Laverick SM, Branch TA & Gales N (2014) Migratory movements of pygmy blue whales (Balaenoptera musculus brevicauda) between Australia and Indonesia as revealed by satellite telemetry. PLOS one, April 2014 9(4).

Eni (2000). Corkybark-1/1A ST1 Well Completion Report Volume 1 of 1 (Interpretive Data), Perth WA. https://nopims.dmp.wa.gov.au/

Falkner, I., Whiteway, T., Przeslawski, R. and Heap, A.D. (2009). Review of Ten Key Ecological Features (KEFs) in the North-west Marine Region. Geoscience Australia, Record 2009/13. Geoscience Australia, Canberra. 117pp.

Finneran, J.J., E. Henderson, D. Houser, K. Jenkins, S. Kotecki, and J. Mulsow. 2017. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III). Technical report by Space and Naval Warfare Systems Center Pacific (SSC Pacific). 183 pp. https://apps.dtic.mil/dtic/tr/fulltext/u2/a561707.pdf

Ford, J.K.B. (2002). Killer whale. Encyclopedia of marine mammals. Page(s) 669-676. Academic Press, San Diego.

Fowler, A. and Booth, D.J (2012). 'Evidence of sustained populations of a small reef fish on artificial structures. Does depth affect production on artificial reefs?' Journal Of Fish Biology, vol. 80, no. 3, pp. 613-629.

Four Vanguard Servicos E Navegacao (FVSN). (Undated), Woollybutt Project Subsea Abandonment Scope of Works, WC8-9000-11-0035.

Francis, M., S. Campana, & C. Jones (2007). Age under-estimation in New Zealand porbeagle sharks (Lamna nasus): is there an upper limit to ages that can be determined from shark vertebrae?. Marine and Freshwater Research. 58(1):10-23.

French, D.P. (2000). Estimation of Oil Toxicity Using an Additive Toxicity Model. In: Proceedings of the 23rd Arctic and Marine Oilspill Program (AMOP) Technical Seminar, June 14-16, 2000. Vancouver, British Columbia.

French-McCay DP (2002) Development and application of an oil toxicity and exposure model, OilToxEx. Environmental Toxicology and Chemistry, vol. 21, No. 10. September 2002.

French-McCay, DP 2003, 'Development and application of damage assessment modelling:example assessment for the North Cape oil spill', *Marine Pollution Bulletin*, vol. 47, no. 9-12,pp. 341-359.

French, D.P. (2009) State of the art and research needs for oil impact assessment modelling. Proceedings of the 32nd AMOP Technical Seminar on Environmental Contamination and Response, Emergency Services Division, Environment Canada. Ottawa, ON, Canada.

Fugro (2005). Woollybutt Project – Permit WA-234-P Geophysical Investigation Final Survey Report Volume 1 – Text and Appendices. Report prepared for Eni Australia Limited by Fugro Survey Pty Ltd, Perth, Australia. Document Number HY16434.

Fugro (2010), Four Rainbow and Woollybutt 2010 Subsea IMR Campaign, ENI Doc. No. 2010 CP Survey, Rev 1, Mar 2010.

Fugro (2020). Woollybutt Subsea Inspection – anomaly report. 02255-40-TEM-005 Rev0.

Gedamke J, Gales N, Hildebrand J & Wiggins S (2007) Seasonal occurrence of low frequency whale vocalisations across eastern Antarctic and southern Australian waters, February 2004 to February 2007. IWC SC/59/SH5.

Gales, N., McCauley, R.D., Lanyon, J., and Holley, D. (2004). Change in abundance of dugongs in Shark Bay, Ningaloo and Exmouth Gulf, Western Australia: evidence for large-scale migration. Wildlife Research 31: 283-290.

Garavanta, C.A.M., & R.D. Wooller (2000). Courtship behaviour and breeding biology of Bridled Terns Sterna anaethetus on Penguin Island, Western Australia. Emu. 100:169-174

Gaughan, D.J. and Santoro, K. (eds). (2018). *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2016/17: The State of the Fisheries*. Department of Primary Industries and Regional Development, Western Australia.

Gaughan, D.J., Molony, B. and Santoro, K. (eds). 2019. *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2017/18: The State of the Fisheries*. Department of Primary Industries and Regional Development, Western Australia

Gaughan, D.J. and Santoro, K. (eds). (2020). *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2018/19: The State of the Fisheries*. Department of Primary Industries and Regional Development, Western Australia

Geotechnical Services Ltd, (2002). Laboratory Scale Weathering and Dispersibility of Oil Report. Report number: ENV 02-228.

Geraci, J. (1998) Physiological and toxicological effects of cetaceans, in:Geraci J., St Aubin, D. (Eds.) Synthesis of Effect of Oil on Marine Mammals , OCS Study, Department of Interior, Ventura, pp.168-202.

Gotz, T., Hastie, G., Hatch, L., Raustein, O., Southall, B., Tasker, M., et al. 2009. Overview of the impacts of anthropogenic underwater sound in the marine environment. OPSAR commission

Gratwicke, B. and Speight, M.R., 2005. The relationship between fish species richness, abundance and habitat complexity in a range of shallow tropical marine habitats. Journal of Fish Biology 66, 650–667.
Gilmour, J., Speed, C.W., Babcock, R. (2010). Coral reproduction in Western Australia. PeerJ, DOI 10.7717/peerj.2010.

Grimwood, M.J. & Dixon, E. 1997. Assessment of risks posed by List II metals to Sensitive Marine Areas (SMAs) and adequacy of existing environmental quality standards (EQSs) for SMA protection. Report to English Nature

Guinea, M.L. (1993). Reptilia, Aves and Mammalia. In: in Russell, B.C. & J.R. Hanley, eds. Survey of Marine Biological and Heritage Resources of Cartier and Hibernia Reefs, Timor Sea. Page(s) 74 – 83. Darwin: Northern Territory Museum of Arts and Sciences.

Guinea, M.L. & S.D. Whiting (2005). Insights into the distribution and abundance of sea snakes at Ashmore Reef. The Beagle (Supplement 1). Page(s) 199-206.

Gulec, I., Leonard, B. and Holdway, D.A. (1997). Oil and dispersed oil toxicity to amphipods and snails. Spill Science & Technology Bulletin, 4(1), 1-6.

Gulec, I. and Holdway, D.A. (2000). Toxicity of crude oil and dispersed crude oil to ghost shrimp Palaemon serenus and larvae of Australian bass Macquaria novemaculeata", ENVIRON TOX, 15(2), 2000, pp. 91-98

Hamann, M., Owens, D. and Limpus, C.J. 2002. Reproductive cycles in male and female sea turtles. In: P.L. Lutz, J.A. Musick and J. Wyneken (eds) The Biology of Sea Turtles, Vol. 2. CRC Press, Boca Raton, Florida.

Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. (2008). Tursiops aduncus. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 16 June 2012.

Hatch, L.T. and Southall, B.L. (2009). Module 5: Shipping. In: Overview of the impacts of anthropogenic underwater sound in the marine environment. OSPAR Commission, OSPAR Secretariat, London.

Hannay, D., A. MacGillivray, M. Laurinolli, and R. Racca. 2004. Sakhalin Energy: Source Level Measurements from 2004 Acoustics Program. Document Number Version 1.5. Technical report prepared for Sakhalin Energy by JASCO Applied Sciences.

Hazel J, Lawler IR, Marsh H and Robson S (2007). Vessel speed increases collision risk for the green turtle Chelonia mydas. Endangered Species Research, 3: 105–113.

Higgins, P.J. & S.J.J.F. Davies, eds (1996). Handbook of Australian, New Zealand and Antarctic Birds. Volume Three - Snipe to Pigeons. Melbourne, Victoria: Oxford University Press

Heinsohn *et al.* (1977) Heinsohn G, Wake J, Marsh H, Spain A. The dugong (*Dugong dugon* (Müller)) in the seagrass system. Aquaculture. 1977;12:235–248. doi: 10.1016/0044-8486(77)90064-3. [Cross Ref]

Hinwood, J.B. and Denis, L.R. (1998). Environmental Issues in Pipleine Facility Abandonment. APPEA Journal 1998. AME CRC C98/24.

Hinwood, J.B., Poots A.E., Dennis L.R., Carey J.M., Houridis H., Bell R.J., Thomson J.R., Boudreau P., and Ayling A.M. (1994). Drilling activities. Pages 123-207 In: J.M. Swan, J.M. Neff, and P.C. Young, eds., Environmental Implications of Offshore Oil and Gas Development In Australia Findings of an Independent Scientific Review.

IUCN—see International Union for Conservation of Nature and Natural Resources.

JASCO Applied Science, 2013. Underwater Sound Modelling of Low Energy Geophysical Equipment Operations. Author: Mikhail Zykov. Available online: https://www.slc.ca.gov/wp-content/uploads/2018/09/AppG.pdf

Jenner, K.C.S., Jenner, M.-N.M. and McCabe, K.A. (2001). Geographical and temporal movements of humpback whales in Western Australian waters. Australian Petroleum Production and Exploration Association Journal, 41: 749-765.

Jensen, A.S. Sibler, K. (2003). Large whale ship strike database. U.S. Department of Commerce. National Oceanic and Atmospheric Administration. Technical Memorandum NMFS-OPR-. 37 pp.

Jimenez-Arranz, G., Glanfield, R., Banda, N. and Wyatt, R., 2017. Review on Existing Data on Underwater Sounds Produced by the Oil and Gas Industry. Submitted to E&P Sound & Marine Life.

Jones, HP, Tershy, BR, Zavaleta, ES, Croll, DA, Keitt, BS, Finkelstein, ME & Howald, GR 2008, 'Severity of the effects of invasive rats on seabirds: a global review', Conservation Biology, vol. 22, No. 1, pp. 16–26 Kimberley Birdwatching 2004, Ashmore Reef cruise, trip report 24–31 October 2004, viewed 24 May 2011.

Joyce, W., S. Campana, L. Natanson, N. Kohler, H. Pratt Jr. & C. Jensen (2002). Analysis of stomach contents of the porbeagle shark (Lamna nasus Bonnaterre) in the northwest Atlantic. ICES Journal of Marine Science. 53:1263-1269.

Kato, H. (2002). Bryde's Whales Balaenoptera edeni and B. brydei. In: Perrin W.F., B. Wrsig & H.G.M. Thewissen, eds. Encyclopedia of Marine Mammals. Page(s) 171-177. Academic Press.

Kangas, M., Sporer, E., Wilkin, S., Koefoed, P., Cavalli, P., Pickles, L., 2017c. Gascoyne Exmouth Gulf prawn resource status report 2016, in: Fletcher, W., Mumme, M., Webster, F. (Eds.), Status Reports of the Fisheries and Aquatic Resources of Western Australia 2015/2016: State of the Fisheries. Department of Fisheries, Perth, pp. 99-104.

Ketten and Bartol. (2005). Functional Measures of Sea Turtle Hearing', doc no. 20060509038, Sept 2005. In: SVT Engineering Consultants. CLU80 Underwater Noise Assessment. Rio Tinto. Report reference: Rpt02-075066-Rev0. June 2008.

Koops, W., Jak, R.G., and van der Veen, D.P.C. (2004). 'Use of dispersants in oil spill response to minimize environmental damage to birds and aquatic organisms', paper presented at the Interspill 2004, 14-17 June 2004.

Last, P., Lyne, V., Yearsley, G., Gledhill, D., Gomon, M., Rees, T. and White, W. (2005). Validation of National Demersal Fish Datasets for the Regionalisation of the Australian Continental Slope and Outer shelf (> 40m depth). Department of Environment and Heritage and CSIRO Marine.

Laist *et al*. (2001). Laist, David & Knowlton, Amy & Mead, J.G. & Collet, A.S. & Podestà, Michela. Collisions between ships and whales. Marine Mammal Science. 17. 35-75.

Limpus, C.J., C.J. Parmenter, V. Baker & A. Fleay (1983). The Crab Island sea turtle rookery in north-eastern Gulf of Carpentaria. Australian Wildlife Research. 10:173-184.

Limpus, C.J. (1992). The hawksbill turtle, Eretmochelys imbricata, in Queensland: population structure within a southern Great Barrier Reef feeding ground. Wildlife Research. 19(4):489-506.

Limpus, C.J (2009). A biological review of Australian marine turtle species. 6. Leatherback turtle, Dermochelys coriacea (Vandelli). Queensland: Environmental Protection Agency.

Limpus, C.J. and N. MacLachlin (1994). The conservation status of the Leatherback Turtle, Dermochelys coriacea, in Australia. In: James, R, ed. Proceedings of the Australian Marine Turtle Conservation Workshop, Gold Coast 14-17 November 1990. Page(s) 63-67. Queensland Department of Environment and Heritage. Canberra: ANCA.

MacDermid Offshore Solutions (MacDermid) (2006). Oceanic HW 443. Revised 10.03.07.

Mackie M.C., Lewis P.D., Kennedy J., Saville K., Crowe F., Newman, S.J. and Smith K.A. (2004), Western Australian Mackerel Fishery Department of Fisheries, Western Australia ESD Report Series No. 7, September 2010.

McLean, D.L., Taylor, M.D., Partridge, J.C., Gibbons, B., Langlois, T.J., Malseed, B.E., Smith, L.D. and Bond, T., 2018. Fish and habitats on wellhead infrastructure on the north west shelf of Western Australia. Continental Shelf Research, 164, pp.10-27.

McLean, D.L., Taylor, M.D., Partridge, and Bond T 2018b Fish-habitat associations on exploration and production wellheads, North-west Shelf". June 2018, Version 3, 46 pages.

Marquez, R. (1990). FAO Species Catalogue; Sea Turtles of the World. An annotated and illustrated catalogue of the sea turtle species known to date. FAO Fisheries Synopsis. 125 (11):pp 81. Rome: Food and Agriculture Organisation of United Nations.

McCauley, R.D. (1998) Radiated underwater noise measured from the drilling rig Ocean General, rig tenders Pacific Ariki and Pacific Frontier, fishing vessel Reef Venture and natural sources in the Timor Sea, Northern Australia. Report to Shell Australia.

McCauley, R., 2005. Underwater sea noise in the Otway Basin – drilling, seismic and blue whales, Oct-Dec 2003, in: Howell, E. (Ed.), A Compilation of Recent Research into the Marine Environment. Australian Petroleum Exploration Association, Canberra, pp. 18–19.

McCauley RD & Jenner C (2010) Migratory patterns and estimated population size of pygmy blue whales (Balaenoptera musculus brevicauda) traversing the Western Australian coast based on passive acoustics. SC/62/SH26 [Online] Available from: http://www.iwcoffice.co.uk/_documents/sci_com/SC62docs/SC-62-SH26.pdf.

McCauley, R.D and Duncan, A.J,. 2003. Underwater Acoustic Environment, Otway Basin, Victoria. Report prepared for Woodside Energy and Curtin University, Perth, Western Australia.

McCosker, J.E. (1975). Feeding behaviour of Indo-Australian Hydrophiidae. In: Dunson, W. A., ed. The Biology of Sea Snakes. Page(s) 217-232. Baltimore: University Park Press.

Meike, S., Castro, C., Gonzalez, J., and Williams, R. (2004). Behavioural responses of humpback whales (Megaptera novaeangliae) to whale watching boats near Isla de la Plata, Machalilla National Park, Ecuador, Journal of Cetacean Research and Management, vol. 6, no. 1, pp. 63-68.

Mora, Renzo. Penco, Sara. Guastini, Luca (2010). The Effect of Sonar on Human Hearing 2010. DOI: 10.5772/18683

Möller, L.M. & L.B. Beheregaray (2001). Coastal bottlenose dolphins from southeastern Australia are Tursiops aduncus according to sequences of the mitochondrial DNA control region. Marine Mammal Science. 17:249-263.

Moore, N.F. (2012), Parliamentary Question On Notice No. 5598, Parliament of Western Australia.

National Marine Fisheries Service (NMFS), 2001. National Marine Fisheries Service Fisheries Statistics and Economics Division, Silver Spring, MD.

National Marine Fisheries Service (NMFS), 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts.

NOPSEMA (2019). Environment Bulletin A652993. April 2019. Available online at https://www.nopsema.gov.au/assets/Bulletins/A652993.pdfU.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59. 167 pp.

National Native Title Tribunal (NNTT) (2012). Western Australia Native Title Applications and Determination Areas. Australian Government, Canberra. Viewed online July 2012: <http://www.nntt.gov.au/Mediation-and-agreement-making-services/Geospatial-services/Maps/Pages/State-Maps.aspx>.

Nedwell, J.R and Edwards, B. (2004). A review of underwater man-made noise carried out by Subacoustech Ltd., 1993 – 2003. Subacoustech Report Ref: 543R0109.

Neptune (2014). Woollybutt Decommissioning Bathymetric and NORMs Survey Results Report. Unpublished report Prepared for Eni. RepORt No.: J1922-RR-001 Rev 0 Date: 12.11.2104.

Negri, A.P., Heyward, A.J., 2000. Inhibition of fertilization and larval metamorphosis of the coral Acropora millepora (Ehrenberg, 1834) by petroleum products. Marine Pollution Bulletin 41: 420–427.

Nelson, JB 2005, *Pelicans, cormorants, and their relatives: Pelecanidae, Sulidae, Phalacrocoracidae, Anhingidae, Fregatidae, Phaethontidae, Bird families of the world* 17, Oxford University Press, United Kingdom.

NOAA (2016) Office of Response and Restoration; Characteristics of Small Diesel Spills http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/resources/small-diesel-spills.html viewed online 21 September 2016.

NOPSEMA (2015). NOPSEMA briefing and MODU mooring sustems in cyclonic conditions briefing. https://www.nopsema.gov.au/assets/Presentations/Presentation-NOPSEMA-briefing-and-MODUmooring-systems-in-cyclonic-conditions-Sept–2015.pdf

Pade, N., N. Queiroz, N. Humphries, M. Witt, C. Jones, L. Noble & D. Sims (2009). First results from satellite-linked archival tagging of Porbeagle shark, Lamna nasus: area fidelity, wider-scale movements and plasticity in diel depth changes. Journal of Experimental Marine Biology and Ecology. 370:64-74.

Pendoley, K.L. (2005). Sea turtles and the environmental management of industrial activities in north-west Western Australia. Ph.D. Thesis. PhD Thesis, Murdoch University: Perth.

Perrin, W.F. & R.L. Brownell, Jr (2002). Minke Whales Balaenoptera acutorostrata and B. bonaerensis. In: Perrin W.F., Würsig B. & H.G.M. Thewissen, eds. Encyclopedia of Marine Mammals. Page(s) 750-754. Academic Press.

Plunkett, G. (2003). Sea Dumping in Australia : Historical and Contemporary Aspects. Defence Publishing Service.

Pradella, N., Fowler, A.M., Booth, D.J., Macreadie, P.I., 2014. Fish assemblages associated with oil industry structures on the continental shelf of north-western Australia: FISH ASSEMBLAGES ON OIL INDUSTRY STRUCTURES. Journal of Fish Biology 84, 247–255. doi:10.1111/jfb.12274

Quigel, J.C. and W.L. Thorton. 1989. Rigs to Reefs – A case history, pps 77-83 in Petroleum Structures as Artificial Reefs: A Compendium. V.C. Reggio, Jr. eds. Minerals Management Service. U.S. Department of the Interior, OCS Study MMS-89-0021.

Reardon, M.B., Gerber, L. & Cavanagh, R.D. 2006. Isurus paucus. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 16 June 2012.

Richardson, W.J., C. Greene Jr., C.I. Malme, and D.H. Thomas. (1995). Marine mammals and noise. Academic Press, Sydney. 576 pp.

Risk Management Technologies (RMT). 2003. ChemAlert Report. Full Report. Oceanic HW 443 (UK). Report prepared by Risk Management Technologies for ChemAlert.

RPS (2010). Technical Appendix. Marine Turtles. Wheatstone Project EIS/ERMP. Report prepared for Chevron Australia Pty Ltd.

Saunders, R., F. Royer & M. Clarke (2011). Winter migration and diving behaviour of Porbeagle shark, Lamna nasus, in the Northeast Atlantic. ICES Journal of Marine Science. 68(1):166-174.

Scholten, MCTh Kaag, NHBM, Dokkum, HP Jak, RG Schobben, HPM and Slob, W. (1996). Toxische effecten van olie in het aquatische milieu, TNO report TNO-MEP – R96/230, Den Helder, The Netherlands.

SEWPaC – see Department of Sustainability, Environment, Water, Population and Communities.

Simmonds, M., Dolman, S., Weilgart, L., 2004. Oceans of noise, WDCS Science Report. Whale and Dolphin Conservation Society, Chippenham.

Smit, M., Bechmanm, R., Hendriks., and Sanni., S (2009). Relating biomarkers to whole-organism effects using species sensitivity distributions: A pilot study for marine species exposed to oil, *Environmental Toxicology and Chemistry,* Vol. 28, No. 5, pp 1104 – 1109.

Southall, B. L., A. E. Bowles, W. T. Ellison, J. J. Finneran, R. L. Gentry, C. R. Greene Jr., D. Kastak, D. R. Ketten, J. H. Miller, P. E. Nachtigall, W. J. Richardson, J. A. Thomas, and P. L. Tyack. (2007). Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33: 411-521.

Southall B L, Finneran J J, Reichmuth C, Nachtigall P E, Ketten D R, Bowles A E, Ellison W T, Nowacek D P, Tyack P L. 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 2019, 45(2), 125-232, DOI 10.1578/AM.45.2.2019.125.

Spotila JR (2004) Sea turtles: a complete guide to their biology, behavior, and conservation. Johns Hopkins University Press, Baltimore, MD.

Storr, G.M., Smith, L.A., and Johnstone, R.E. (2002) Snakes of Western Australia. Perth: Western Australia: Western Australian Museum.

Threatened Species Scientific Committee (2015). Conservation Advice: Megaptera novaeangliae humpback whale, Committee established under the Environment Protection and Biodiversity Conservation Act 1999.

Thiele, D. & P.C. Gill. (1999). Cetacean observations during a winter voyage into Antarctic sea ice south of Australia. Antarctic Science. 11(1):48-53.

United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2016), Ningaloo Coast, <http://whc.unesco.org/en/list/1369> Viewed online 20 September 2016.

United Nations Educational, Scientific and Cultural Organisation (UNESCOb) (2016). Komodo National Park. <http://whc.unesco.org/en/list/609> Viewed online 20 September 2016.

URS (2001). Woollybutt Field Development Environmental Field Investigation (Draft). Report prepared for Eni Australia Limited by URS, Perth, Western Australia. Document Number WIN-0000-RN-0001.

Vanguard (2002), Mid Depth Buoy Detailed Design Basis, ENI Doc. No. 2000-DH-0001, Rev B1, May 2002.

Walker, D.I., and McComb, A.J. (1990). Salinity response of the seagrass *Amphibolus* Antarctica: an experimental validation of field results. Aquatic Botany 36:359-366.

Western Australian Fishing Industry Council (WAFIC). (2018). West Coast Deep Sea Crustacean Fishery. <http://www.wafic.org.au/fishery/west-coast-deep-sea-crustacean-fishery/> Viewed online 3 September 2018.

Whitehead, H. (2002). Estimates of the current global population size and historical trajectory for sperm whales. Marine Ecology Progress Series. 242:295-304.

Wilson, S.G., J.G. Taylor & A.F. Pearce (2001). The seasonal aggregation of whale sharks at Ningaloo Reef, Western Australia: currents, migrations and the El Niño/Southern Oscillation. Environmental Biology of Fishes. 61:1-11.

Wilson, S.G., J.J. Polovina, B.S. Stewart & M.G. Meekan (2006). Movements of Whale Sharks (Rhincodon typus) tagged at Ningaloo Reef, Western Australia. Marine Biology. 148:1157-1166.

Witherington, B. E., Martin, R. E. (1996). Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches, TR-2. St. Petersburg, Florida,Florida Marine Research Institute: 73.

Witzell WN (1983) Synopsis of biological data on the hawksbill turtle, Eretmochelys imbricata (Linnaeus, 1766). Fisheries Synopsis 137. Food and Agriculture Organization, Rome.

Woodhams, J., Viera, S., and Stobuzki, I. (eds). (2012). Fishery Status Reports 2011, Australian Bureau of Agriculture and Resource Economics and Sciences, Canberra.

Woodside Energy Ltd (Woodside). (2011). Browse LNG Development Draft Upstream Environmental Impact Assessment. EPBC Referral 2008/4111, November 2011.

Woodside (2020). Scarborough Offshore Project Proposal. Revision 5. February 2020. Available online: https://www.nopsema.gov.au/assets/OPPs/A724553.pdf

Zerbini, A.N., E.R. Secchi, S. Siciliano & P.C. Simões-Lopes (1997). A review of the occurrence and distribution of whales of the genus Balaenoptera along the Brazilian coast. Reports of the International Whaling Commission. 47:407-417.

# APPENDICES

# APPENDIX A:

# ENI HEALTH, SAFETY AND ENVIRONMENT STATEMENT

# health safety & environment statement

**Eni Australia Ltd, in its natural resources and energy evolution activities is committed to providing a safe work place, safe systems of work, a competent workforce and a culture conducive to exercising prudent Health, Safety and Environment (HSE) practices and behaviours.**

**This commitment statement applies to all operational activities undertaken by Eni Australia Ltd, including activities carried out by our contractors.**

Eni Australia Ltd will:

- Provide a safe and healthy workplace for the prevention of worker related injury and ill health.
- Set objectives and targets to ensure continual improvement in overall HSE performance.
- Comply with relevant legislation and other obligations, or apply company standards where laws and regulations do not exist.
- Assess and manage HSE risks across the business life cycle.
- Adopt high management and technical standards to prevent and mitigate major accidents associated with process safety events.
- Include HSE performance in appraisal of staff and contractors.
- Respect the environment and prevent pollution by actively monitoring and managing emissions, effluents, discharges and other impacts on the environment.
- Endeavour to reduce greenhouse gas emission intensity, fugitive emissions and process flaring as part of our climate strategy.
- Provide systems, resources and skills to maintain emergency response capabilities.
- Consult with stakeholders, local communities and public interest groups, workers and their representatives.
- Remain committed to sustainable development and the welfare of our host communities, and
- Promote HSE best practice in all our activities.

All staff and contractors at Eni Australia Ltd have a personal responsibility to support this HSE Statement and are encouraged to openly report any HSE issue or concern. In addition, everyone is obliged to intervene in unsafe acts or conditions to prevent injury, environmental impact or damage to assets.

Managing Director _____
Ernie Delfos

Date 10 August 2020

eni australia

# APPENDIX B:

# FIELD INFRASTRUCTURE

**Table 1: Woollybutt Subsea Inventory**

| Subsea Infrastructure | Qty | Length | Decommissioning schedule |
|---|---|---|---|
| Production Manifold (SB1M & WB4M) | 2 | - | To be removed as per Schedule in Section 3.4.3 of the EP (Equipment Recovery). |
| UTA | 2 | - | |
| CDU (Near SB1M) | 1 | - | |
| Disconnect able Single Point Mooring (DSPM) | 1 | - | |
| MDB Gravity Base | 2 | - | |
| MDB Tether Chain | 2 | - | |
| SUTU (Near WBT1 and SB1 Xmas Trees) | 2 | - | |
| UEU (near SB1 manifold) | 1 | - | |
| Transition Guide Base (TGB) | 2 | - | |
| Flying Leads (EFL/HFL) ( Near WB2A, SB1, WB4) | 16 | ~10m-50m | |
| Guidebase and wellheads (SB1, WB4, WB2A, WB2, WB1H, WB3A, WB5A, WB5, WB6H) | 9 | - | |
| 5-1/2" OD Tubing (WBT1, SB1,WBT2, WBT4) | ~545 joints | - | |
| Horizontal Christmas Trees (HXT) (SB1, WB4, WB2A, WB1H) | 4 | - | |
| Anode skids | 10 | - | |
| Guidebase and non-production wellhead (Corkybark-1) | 1 | - | To be abandoned in-situ as per Section 3.5.1.2 of the EP |
| 6" Flexible Jumper (SB1 manifold to WB2A XT) | 1 | 17m | Subject to future decommissioning under a separate EP as per Section 3.4.4 of the EP (Decommissioning) |
| 4" Flexible Jumper (SB1 manifold to WB2A XT) | 1 | 21m | |
| 6" Flexible Flowline (SB1M to SB1) | 1 | 1,670m | |
| 2-1/2" Flexible Flowline (SB1M to SB1) | 1 | 1,670m | |
| EHU (SB1 SUTU to CDU near SB1 manifold) | 1 | 1,670m | |
| 6" Flexible Flowline (SB1M to WB4M) | 1 | 5,750m | |
| 4" Flexible Flowline (SB1M to WB4M) | 1 | 5,750m | |
| 6" Flexible Jumper (WB4M to WB4) | 1 | 50m | |
| 4" Flexible Jumper (WB4M to WB4) | 1 | 50m | |
| EHU (WB2a to WB4) | 1 | 5,750m | |
| Crossing Mattresses | 8 | - | |
| FPSO Mooring system - Chains | 6 | 5,182m | |
| FPSO Mooring system - Anchors | 6 | - | |
| 6" Flexible riser, DSPM to SB1M | 1 | 1,045m | |
| 2-1/2" Flexible riser, DSPM to SB1M | 1 | 1,035m | |
| 6" Flexible riser, DSPM to WB1A | 1 | 1,045m | |
| 2-1/2" flexible riser, DSPM to WB1A | 1 | 1,035m | |
| EHU, DSPM to SUTU near SB1 Manifold | 1 | 1,075m | |
| EHU, DSPM to SUTU Near WB1 Tree | 1 | 1,075m | |
| MDB | 2 | | Removed in Q4 2020 |

# APPENDIX C:

# EXISTING ENVIRONMENT

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# 1 DESCRIPTION OF THE ENVIRONMENT

This Appendix supplements Section 4 of the EP and describes the environment within the Zone of Potential Impact (ZPI) (refer to Section 4.1 of the EP). It includes details of the relevant values and sensitivities of the environment as required by the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and State Western Australian Petroleum (Submerged Lands) (Environment) Regulations 2012.

Searches for protected species listed under the EPBC Act were undertaken in March 2021 for the Operational Area and ZPI (refer to Section 1.6) using the DoAWE Protected Matters Search Tool for the purpose of identifying matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This document is informed by this search. Descriptions of all fauna are provided, with a focus on protected species that are threatened and migratory.

## 1.1 Physical Environment

### 1.1.1 Climate

The climate of the NWMR is subtropical with moderate winters and very hot summers. Climate statistics provided in this section are derived from recordings at Barrow Island (between 1967 and 2000). Barrow Island is located approximately 35 km to the east of the Operational Area and within the ZPI. Daily temperatures in summer (December to March) range from 24 °C to 35 °C. Winter (June to August) daily temperatures range from 17 °C to 26 °C (Figure 1-1) (BOM, 2017).

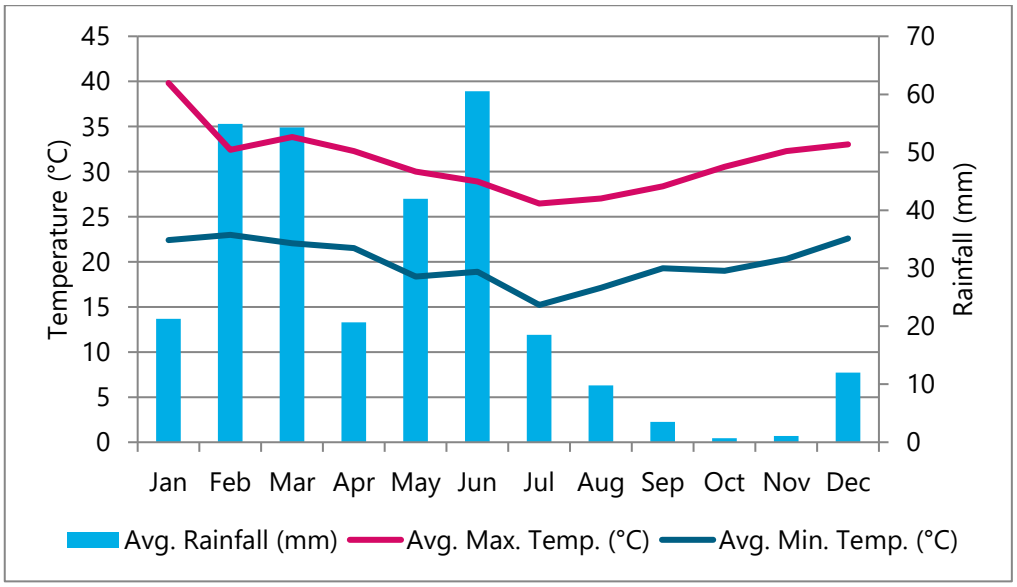



**Figure 1-1: Mean monthly average maximum and minimum temperature and mean rainfall from 1967 to 2000 at Barrow Island (BOM 2017)**

### 1.1.2 Rainfall

The region experiences low rainfall, with an annual average of 306 mm. The highest rainfall generally occurs from January to April, associated with tropical cyclones, and

then from May to June, associated with winter weather systems. On average, two tropical cyclones each year are expected to affect the Operational Area each year. However, this number is highly variable.

### 1.1.3 Wind Pattern

During October to March, winds are predominantly south-westerly or southerly in the morning, tending more westerly in the afternoon. The strongest prevailing winds are generally experienced between October and January, with wind speeds often ranging between 25 and 40 km/hr. During May to July, winds are mainly easterly, sometimes swinging southerly in the afternoon.

April is a transitional period when the winds are light and variable (mostly less than 20 km/hr). Wind direction is southerly or south-easterly in the morning, turning either north-easterly or south-westerly in the afternoon. August is the second transitional period of variable winds with directions generally southerly or south-easterly in the morning, with south-westerly or north-easterly winds in the afternoon. Hurricane-force winds associated with cyclones within the region can reach speeds of up to 240 km/h.

### 1.1.4 Bathymetry

The bathymetry of the NWMR is defined in four zones, each characterised by different water depths and geomorphic features. These zones include the inner continental shelf, middle continental shelf, the continental slope/outer shelf and the abyssal plain. Water depths range between 0 to 30 m within the inner continental shelf area, increasing from 30 to 120 m along the middle continental shelf. The continental slope/outer shelf area features depths greater than 120 m and gradients between 5 and 20 degrees representing a paleo-shoreline.

The water depth in the Operational Area is approximately 100 m. To the north-west, the water deepens gradually across the outer continental shelf before falling more steeply to form the continental slope. To the east, the seafloor shallows slowly before rising to form the shoals and islands that include Barrow Island and the Montebello Islands, located approximately 35 km and 65 km to the north-east respectively. Further east and to the south, the seafloor rises towards the shallow waters and shoreline of the Exmouth Peninsula and Pilbara Coast.

### 1.1.5 Oceanography

The major surface currents in the Region flow polewards, away from the equator. Their waters are warm, have low salinity and are oligotrophic (low in nutrients). The major surface currents influencing the Region include the Indonesian Throughflow, the Leeuwin Current, the South Equatorial Current and the Eastern Gyral Current (Figure 1-2). In addition, the Ningaloo Current, the Holloway Current, the Shark Bay Outflow and Capes Current are seasonal surface currents in the Region (Commonwealth of Australia, 2012). The effect of these currents is described in subsequent sections of this chapter.

Water circulation in the Northwest Shelf Province is highly seasonal. During winter, when the southern flow of the Throughflow is greatest, it dominates the water column. During summer when the Throughflow is weaker, strong winds from the southwest cause

intermittent reversals of the currents, which may be associated with occasional weak upwellings of colder, deeper water onto the shelf. The Ningaloo Current is also thought to intrude into the southern part of this bioregion during summer, flowing through the Operational Area and ZPI towards the north as far as Barrow Island.

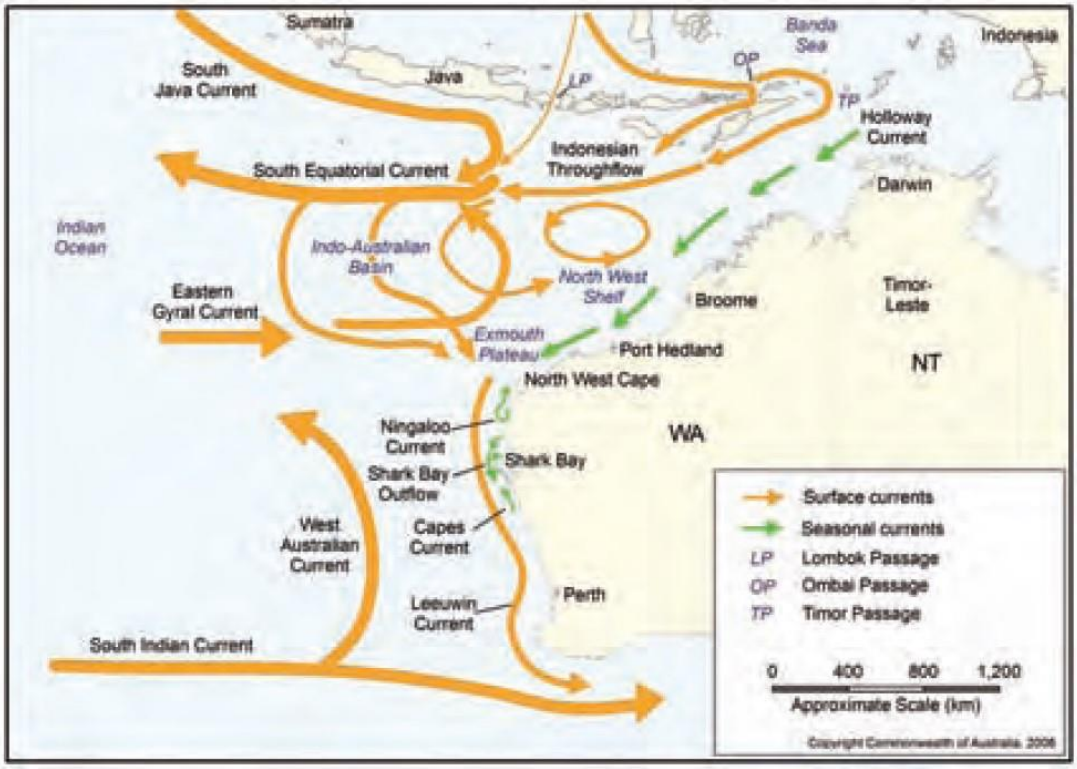



**Figure 1-2: Surface currents in the North-West marine region**

Tides are semi-diurnal with ranges of about 1 m on neap tides, increasing to 2.5 m on spring tides (AEL, 2010). Tidal movement is generally east-west at 0.1 m/s (AEL, 2010). In contrast to tidal currents, surface wind-driven currents range up to 0.8 m/s. Internal waves in the lower water column may have speeds of up to 0.7 m/s, and currents of up to 0.3 m/s can be encountered near the bottom.

Internal tides, although generated primarily around the shelf break, may have an influence in this bioregion as the crests of internal waves radiate onshore from the shelf break as far as the stratification of the water layer extends. When internal waves break they can cause mixing of more nutrient-rich water within the photic zone, which may in turn result in a burst of biological productivity.

Cyclones are another significant physical driver in this bioregion. The North West Shelf experiences an average of four cyclones each year, two of which make landfall. Cyclone-generated storm currents can cause significant sediment movement on the seafloor as well as vertical mixing of the water column. While cyclones can be very influential at the local scale, the overall contribution of cyclones to regional biological productivity is considered to be low.

Swell waves consistently propagate from the southwest, generated by distant storms (Chevron Australia, 2005), with heights of up to 2 m, rising to 3 m during the winter.

Extreme swell conditions of greater than 8 m can be encountered during cyclones. Short period waves (1–10 seconds) propagate from the southwest in summer and the east in winter at heights of less than 2 m, but this can increase and the direction change during storms. The largest seas (greater than 2 m) occur during winter (Chevron Australia, 2005).

Water temperatures in the vicinity of the field vary due to seasonal conditions and depth. Temperatures close to the sea surface range from 22°C to 31°C, typical of tropical waters in this region (Chevron Australia, 2005). Temperatures close to the seafloor will be lower.

The offshore waters in the vicinity the Operational Area are relatively clear. As with most of the waters off WA, the ocean in the region is oligotrophic, with very low nutrient and phytoplankton levels (Commonwealth of Australia, 2012). Turbidity increases in summer, mainly due to the increase in plankton load. However regional scale events, such as flooding associated with cyclonic rainfall, may cause occasional periods of increased turbidity.

### 1.1.6 Geomorphology and Geology

There have been four geophysical and ROV surveys in the Woollybutt Field undertaken in August 2001 (URS, 2001), June 2005 (Fugro, 2005), August 2014 (Neptune, 2014) and most recently in 2016.

The URS survey in 2001 showed that the seabed slopes gently down towards the west at a gradient of 1:1000 before dropping away more steeply beyond the western edge of the Operational Area. It also reports that the thickness of the surficial seafloor sediments varied between 0.9 and 5.1 m with approximately 85% of the area having a thickness of <4 m. This layer was interpreted as comprising soft to very soft very silts and fine sand, which are easily disturbed and pock marked by occasional burrows. The underlying layer was interpreted as comprising variably cemented sands or calcarenite.

## 1.2 Key Marine Habitats

### 1.2.1 Regional Overview

The outer continental shelf of the NWMR, where the ZPI is located, is predominantly flat and featureless and comprised of carbonate sands (Baker *et al*., 2008). Primary productivity in the Northwest Shelf Province is thought to occur predominantly in pelagic environments, where phytoplankton plays an important primary producer role, rapidly multiplying when nutrients become available. Although the region has generally low productivity, there are pockets of high species richness and diversity, in particular at the tropical reef sites, such as Ningaloo Reef and around Barrow Island and the Montebello Islands.

The marine habitat within the Operational Area mainly consists of soft sediment and epibenthic flora and fauna, as described below. The broader region, including areas within the ZPI, also contains a diverse range of other habitats, including, seagrasses, hard corals, mangroves, intertidal mudflats and sandflats, sandy beaches and rocky shores.

#### 1.2.1.1 Benthic Communities

The Operational Area comprises of soft sediment habitat in deep water. Unconsolidated sediments support benthic fauna living both in the sediments (infauna) and on the surface (epifauna). In shallow areas soft sediments also support seagrass. However, there is no seagrass habitat in the Operational Area due to its depth. Predominant infauna species in soft sediment habitats are mobile burrowing species including molluscs, crustaceans (crabs, shrimps and smaller related species), polychaetes, sipunculid and platyhelminth worms, asteroids (sea stars), echinoids (sea urchins) and other small animals. Surface species include small crustaceans and molluscs, echinoderms and larger sessile organisms such as sponges, corals, sea whips and sea squirts (DEC, 2006).

Beyond the Operational Area, soft sediment habitats and the infauna are widespread in deeper offshore areas and in more protected inshore environments throughout the ZPI (CALM & MPRA, 2005; DEC, 2006).

#### 1.2.1.2 Epibenthic Flora and Fauna

URS (2001) reports that biota on the seafloor of the Operational Area includes sponges, gorgonians (sea whips and sea fans), soft corals, crinoids (feather stars), ophiuroids (brittle stars), crustaceans (e.g. hermit crabs) and bryozoans (lace corals). The predominant infauna recovered from sediment samples were burrowing and tube-dwelling polychaete worms, brittle stars, gastropods and bivalves (molluscs) and amphipods (crustaceans).

Overall the density of sessile fauna was found to be low, with the larger organisms (feather stars, soft corals and fan corals estimated at occur at a density of approximately 1 per 10 m² for crinoids to 1 per 100 m² for soft corals and less for other species. Burrows, probably occupied by shrimp and gobioid fish, occurred more frequently, but patchily, with a density estimated at between 1 and 5 /m², while small worm tubes were more common.

Surveys undertaken at night showed a marked diurnal pattern in fauna, with small fish, shrimps, mantis shrimps and hermit crabs on or immediately above the seafloor. Larger fish were also more active in the late afternoon and night, as shown by the number of fish observed around the suspended Woollybutt WHs (URS, 2001).

The more recent survey in 2014 (Neptune, 2014) focussed on marine growth on the subsea infrastructure. Sparse to patchy coverage was found on the WB1A, WB2A and WB4 Xmas trees, consisting of hydroid/bryozoan turf, barnacles and encrusting sponges. Growth on SB1 was denser, consisting of moderate to dense coverage of hydroids and bryozoans and included barnacles, sponges and gorgonians (sea fans). The diversity of marine growth observed on or adjacent to the subsea flow-lines was similar across all locations with varying densities observed along the length of individual flow-lines. Marine growth was observed to occur on buried, partially buried and exposed sections of the subsea flow-lines. Growth observed on or adjacent to the subsea flow-lines of the Woollybutt Field included hydroids, bryozoans, soft corals, sponges, gorgonians (sea whips and sea fans), ascidians and other filter feeders.

Soft-bottom substrates, of the Operational Area are similar to those found in other areas of the NWMR such as the Joseph Bonaparte Gulf and along the Pilbara coast. Soft sediments of the NWMR occur in the wider ZPI and support seagrasses, muddy infaunal communities, and deep sessile communities of filter and deposit feeders in the abyssal plains (Commonwealth of Australia, 2012).

#### 1.2.1.3 Coral Reef

Across the NWS, corals tend to occur in relatively shallow areas with strong currents where water movement provides a constant supply of nutrients and particulate food. Hard (Order Scleractinia) and soft (Order Alcyonacea) corals are unlikely to be present within the Operational Area due to the water depth being too great to support zooxanthellae and a lack of hard substrate for coral recruitment.

Coral reefs are known to occur within the wider ZPI but are unlikely to occur within the Operational Area. Notable coral habitat within the wider ZPI include (approximate distance and direction from the closest point of the Operational Area in brackets):

- Montebello Island group (65 km north-east)
- Barrow Island (35 km north-east)
- Ningaloo Coast World Heritage Area (WHA) (incl. Muiron Islands) (110 km south-west).

The closest significant coral reefs to the Operational Area are found fringing the Barrow/Montebello Island groups, Muiron Islands and Ningaloo reef. Significant coral spawning occurs in autumn for a number of species, although some taxa such as Porites and Acropora spp. may spawn in spring and summer (Baird *et al*., 2011; Rosser and Gilmour, 2008). Mass spawning events have been observed along the Ningaloo Coast during March in the North and in April in the South (Gilmour *et* al., 2010).

Further information on sensitive locations with coral reef habitats is provided in Section 1.5.

#### 1.2.1.4 Seagrass Beds and Macroalgae

Seagrasses typically grow in soft sediments in water depths between 2 m and 10 m where there is sufficient light to support photosynthesis. Seagrasses are important primary producers in tropical in-shore waters as they provide energy and nutrients for detrital grazing food webs. They are also directly grazed by protected animals such as dugongs and green turtles, and provide refuge areas for fishes and invertebrates (DEC, 2006).

Seagrasses do not occur within the Operational Area due to its water depth precluding light penetration to the sea floor. Suitable seagrass habitat is found around the Ningaloo coast where light reaching the seabed is sufficient for photosynthesis. Intertidal seagrasses also occur within the ZPI at the Ningaloo coast given the tidal range and areas of intertidal mudflat habitat.

Macroalgae generally attach to hard substrates although some species such Caulerpa, Halimeda, Udotea and Penicillus can anchor in soft sediments or attach to shell

fragments. Macroalgae are important primary producers and support diverse and abundant fauna of small invertebrates that are the principal food source for many in-shore fish species.

Macroalgae does not occur on the benthic substrate within the Operational Area, due to water depth and lack of hard substrate on which to attach. In the ZPI, macroalgae are widely distributed throughout shallower waters, particularly where hard substrates occur. Subtidal macroalgal reefs are also likely to be widespread and will generally occur wherever there is hard substrate suitable for algal recruitment and sufficient light. Subtidal macroalgae often occur with coral reefs, colonising dead coral and coral rubble.

#### 1.2.1.5 Mangroves

Mangroves are productive coastal forest systems, providing habitat and shelter for infauna, epifauna and gastropods, and are important nursery areas for fish, lobster and prawn species. Mangroves may also provide shelter for other species such as juvenile turtles (DEC, 2007a). Ospreys (*Pandion haliaetus*) and white-bellied sea eagles (*Haliaeetus leucogaster*) roost in mangroves, while brahminy kites (*Haliastur indus*) and a range of smaller birds nest in them (DEC, 2007a). Mangroves are also recognised for their capacity to protect coastal areas from erosion due to storms and storm surge.

Mangrove communities in the NWS represent Australia's only 'tropical arid' mangroves (Pedretti and Paling, 2000). WA does not support any unusual, endemic or restricted mangrove species and all mangrove species within WA are common and widespread elsewhere in Australia or in the Indo-pacific region.

Mangroves do not occur in the Operational Area but occur in the ZPI, at the following locations (approximate distance and direction from the closest point of the Operational Area in brackets):

- Barrow Island (35 km north-east)
- Ningaloo Coast (110 km south-west).

#### 1.2.1.6 Sandy Beaches

Sandy beaches provide habitat for a variety of burrowing invertebrates and subsequently provide foraging areas for seabirds. Sandy beaches can also provide turtle nesting habitat, particularly at the Barrow/Montebello/ Lowendal islands and Ningaloo Coast (see Section 1.3.2).

Sandy beaches do not occur in the Operational Area, but are widespread within the ZPI at (approximate distance and direction from the closest point of the Operational Area in brackets):

- Montebello Island group (65 km north-east)
- Lowendal Island group (50 km north-east)
- Barrow Island (35 km north-east)
- Ningaloo Coast (incl. Muiron Islands) (110 km south-west).

#### 1.2.1.7 Spawning, Nursery, Resting and Feeding Areas

Spawning, nursery, resting and feeding grounds are critical habitats for conservation and vary for each species. Biologically Important Areas (BIAs) have been designated for species occurring in the Operational Area and ZPI.

#### 1.2.1.8 Migration Corridors

Seasonal migration of cetaceans, whale sharks, seabirds, shorebirds and other marine species occurs through migration corridors for spawning, nursing and feeding purposes. Migration corridors for protected species passing within the Operational Area or ZPI are detailed in Section 1.3.

#### 1.2.1.9 Plankton

Plankton within the Operational Area and ZPI is expected to reflect the conditions of the wider NWMR.

Phytoplankton is a source of primary productivity in the region and is largely driven by offshore influences. Periodic upwelling and cyclonic events drive coastal productivity and nutrient cyclin. Zooplankton in the region may include organisms which remain as plankton for their entire life cycle (e.g. copepods) in addition to larval stages of other taxa such as fish, coral and molluscs. Zooplankton biomass can peak at certain times of year through coral mass spawning events and fish spawning seasons.

## 1.3 Threatened and Migratory Species and ecological communities

### 1.3.1 Marine Mammals

Threatened and migratory marine mammal species within the Operational Area and ZPI are listed in Section 4.3 of the EP. Details on the species identified are included below.

#### 1.3.1.1 Blue Whale (Endangered/Migratory)

Two subspecies of blue whale are recorded in Australian waters; the southern (or true) blue whale (Balaenoptera musculus intermedia) and the pygmy blue whale (Balaenoptera musculus brevicauda). Southern blue whales are believed to occur in waters south of 60°S and pygmy blue whales occur in waters north of 55°S (i.e. not in the Antarctic) (DEWHA, 2008). By this definition all blue whales in waters from Busselton to the Northern Territory border are assumed to be pygmy blue whales, and are discussed below.

Pygmy blue whales have a southern hemisphere distribution, migrating from tropical water breeding grounds in winter to temperate and polar water feeding grounds in summer (Bannister *et al.*, 1996; Double *et al.*, 2014). The Western Australian migration path takes pygmy blue whales down the Western Australian coast to coastal upwelling areas along southern Australia (*Gill, 2002*) and south at least as far as the Antarctic convergence zone (Gedamke *et al.*, 2007).

The northern migration passes the Perth Canyon from January to May and north bound animals have been detected off Exmouth and the Montebello Islands between April and

August (Double *et al.*, 2012, *McCauley & Jenner, 2010*). During the southern migration, pygmy blue whales pass south of the Montebello Islands and Exmouth from October to the end of January, peaking in late November to early December (Double *et al.*, 2012).

A species recovery plan has been prepared for the blue whale which provides details of their distribution in Australian and potential threats, which include climate variability, noise interference and vessel disturbance (Commonwealth of Australia, 2015).

The BIA for pygmy blue whales, shows that the Operational Area lies within their distribution range and the ZPI intersects their distribution, foraging and migration range. It is during their bi-annual migrations between north and south that pygmy blue whales may pass through the ZPI, widely distributed and in low numbers.

#### 1.3.1.2 Southern Right Whale (Endangered/Migratory)

Southern right whales (*Eubalaena australis)* have undergone a significant reduction in numbers due to historic whaling (SEWPaC, 2012c). A review of the initial recovery plan, developed for the period between 2005 – 2010, found that despite evidence of some population increase in south-west Australian waters, abundance and habitat occupancy numbers are still below historical figures (SEWPaC, 2012c). Current population estimates are approximately 3,500 for the Australian population.

Southern right whales are seasonally present on the Australian coast between about May and November. Southern right whales have been recorded in the coastal waters of all Australian states with the exception of the Northern Territory (Bannister *et al.*, 1996) but usually occur in the mid to lower latitudes anywhere between Sydney and Perth (Bannister 1979—2005). Within their broader geographic range, southern right whales in Australia concentrate in certain areas to breed. Major calving areas in Western Australia are located at Doubtful Island Bay, east of Israelite Bay.

There is no BIA for the southern right whale within 900 km of the Operational Area and ZPI, suggesting it is highly unlikely that the area provides key habitat for biological processes associated with the species. Any individuals observed in the Operational Area or ZPI are likely to be passing through and it is expected unlikely that they would be observed as they generally live at higher latitudes (DoEE, 2017b).

#### 1.3.1.3 Humpback Whale (Vulnerable/Migratory)

Humpback whales (*Megaptera novaeangliae*) have been observed in all oceans worldwide, and are considered the most common baleen whale species in Australia during the Austral winter. They were listed as vulnerable due to their small population size following unsustainable historic whaling practices (Threatened Species Scientific Committee, 2015).

Humpback whales have migration patterns similar to those of blue whales, with seasonal migration through the waters of northwest Australia, from Antarctic summer feeding grounds to winter calving grounds off the Kimberley coast. Southern migration from the calving grounds peaks from late-August to early September but can extend to as late as November in some years (Jenner *et al.*, 2001).

The migration path usually stays within 50 km offshore south of Shark Bay and extends to up to 100 km offshore in the Kimberley region (DoEE, 2017). The southward migration path is typically closer to the coastline (generally in waters less than 200 m water depth), through some areas identified as important corridors which include the coastal waters off Geraldton and around the Abrolhos Islands (more than 800 km away), as well as the coastal area from Point Cloates, at the base of the Ningaloo Coast, extending toward the North West Cape (Jenner *et al.*, 2001). Considering the steadily-increasing humpback whale population size in WA, it is likely that this species will transit through the ZPI during its annual migration between summer feeding grounds in Antarctica and winter breeding grounds in the Kimberley. It may travel through the Operational Area in small numbers during the migratory season. The Operational Area and ZPI lie within the BIA for humpback whales migratory distribution range (DoEE, 2017b).

#### 1.3.1.4 Sei Whale (Vulnerable/Migratory)

The Sei whale (*Balaenoptera borealis*) has a patchy and wide-ranging distribution, favouring deep, offshore habitat more than other large whale species. During the summer they are found between latitudes of 40° to 50° south, and lower winter latitudes are unknown (DotE, 2016b). As Sei whales are not often found near the coastline, the species is infrequently recorded in Australian waters. There is currently no BIA for the sei whale (DoEE, 2016b). As they prefer higher latitudes and colder waters, it is considered unlikely that significant numbers of the species will be present in the Operational Area or ZPI.

#### 1.3.1.5 Fin Whale (Vulnerable/Migratory)

Fin whales *(Balaenoptera physalus)* inhabit offshore waters from tropical to polar regions worldwide. They have been recorded in small numbers in the waters off Western Australia, South Australia, Victoria and Tasmania. As there is a lack of recorded sightings in Australia, abundance and distribution in Australia has been interpolated primarily from whaling records and stranding events. It is likely that fin whales migrate between Australian waters and Antarctic and subantarctic feeding areas and tropical breeding areas in Indonesia (DotE, 2016c). There is currently no BIA for fin whales (DoEE, 2016b). Based upon the low numbers of sightings in the ZPI and Operational Area, it is unlikely that significant populations of fin whale would be present at any time.

#### 1.3.1.6 Antarctic Minke Whale (Migratory)

The Antarctic minke whale (*Balaenoptera bonaerensis*) primarily occupies offshore and pelagic habitats within cold temperate to Antarctic waters between 21° S and 65° S (Bannister *et al.*, 1996; Thiele & Gill, 1999). This species migrates between the summer Antarctic feeding grounds and winter sub-tropical to tropical breeding grounds. On the winter breeding grounds, Antarctic minke whales appear to occupy pelagic waters exceeding 600 m depth (Zerbini *et al.,* 1997). Antarctic minke whales have also been reported up to 350 km south of the ice edge during winter, suggesting that some portions of the population may over-winter in higher latitudes (Perrin & Brownell, 2002; Thiele & Gill, 1999).

As the Operational Area and ZPI do not correspond with any known significant breeding or feeding grounds for this species, it is unlikely that Antarctic minke whales will be

present in significant numbers during P&A activities (DoEE, 2016b). There is no BIA for Antarctic minke whales (DoEE, 2016b).

#### 1.3.1.7 Bryde's Whale (Migratory)

Bryde's whales may be found in all temperate and tropical waters in the Pacific Ocean, Indian Ocean and Atlantic Ocean (Kato, 2002). Population estimates are not available for this species, globally or in Australia, and no migration patterns have been documented in Australian waters (DotE, 2016d).

Bryde's whales have been recorded in both oceanic and inshore waters off all Australian states, except the Northern Territory (DotE, 2016d). Two forms are recognised: inshore and offshore Bryde's whales. Inshore whales live in coastal water less than 200 m, moving in response to prey availability (DotE, 2016d). The offshore form is found in deeper waters (500 to 1000 m) and may migrate seasonally, travelling to warmer tropical waters during the winter, although migration are not well known, and it is believed that they may also remain in warmer waters year round (Kato, 2002).

Individual Bryde's whales have been observed feeding in coastal waters off Carnarvon, and presumed to be part of a non-migratory population (Bannister *et al,.* 1996). Bryde's whale sightings have also been recorded from the Abrolhos Islands and north of Shark Bay (Bannister *et al,* 1996). There is documented evidence that these whales may be also found in deep waters (500-1,000 m).

BIAs for Bryde's whales have not been identified (DoEE, 2016b). The Operational Area and ZPI are unlikely to represent important habitat for Bryde's whales as there is a lack of recorded sightings in the region, but low numbers of this species may transit through the ZPI or Operational Area on occasion.

#### 1.3.1.8 Killer Whale (Migratory)

Killer whales (*Orcinus orca*) have a widespread distribution from polar to equatorial waters around the globe, with preferred habitats of oceanic, pelagic and neritic (relatively shallow waters over the continental shelf) regions (DotE, 2016e). There is no reliable estimate of the global population of killer whales; although regions with well-studied populations of killer whales have abundance estimates available (Ford 2002). The species is listed as Data Deficient by the IUCN.

In Australia, killer whales have been recorded from all state waters and along the Australian continental shelf (Bannister *et al.*, 1996). They appear to be more abundant in cold, deep waters (Bannister *et al.*, 1996). The only area with regular sightings of killer whales is Macquarie Island, a Tasmanian State Reserve and World Heritage Site (Bannister *et al.*, 1996). In South Australia, reports of killer whales included groups of about 10-50 individuals, and frequent sightings of killer whales have also been collected from the Antarctic and Victoria (Bannister *et al.*, 1996). There is no evidence of killer whale migratory behaviour around Australia, and their frequent sightings may be influenced by seasonal changes in prey availability (Bannister *et al.*, 1996).

There are no recognised key habitats or BIAs for killer whales (DoEE, 2016b). Given their wide distribution range, the low numbers recorded in the area historically, their apparent preference for colder waters, this species is unlikely to be present in significant

numbers in the Operational Area or ZPI. Any animals that may occur are likely to be individuals or small groups transiting the area.

#### 1.3.1.9 Sperm Whale (Migratory)

Sperm whales (*Physeter macrocephalus*) are found worldwide and are the largest of all the toothed whale species. Their global distribution is comparable to the killer whale, with regular observations from both polar and equatorial waters (Whitehead, 2002). The IUCN Red List status for sperm whales is Vulnerable.

Sperm whales are sighted frequently in deeper waters and form large aggregations (100–1,000 animals) in foraging grounds of high oceanic productivity (Whitehead, 2002). Female sperm whales have restricted home ranges in water deeper than 1,000 m and less than 40° latitudes (Whitehead, 2002). Male sperm whales will remain with their mothers for several years until early adulthood (4–21 years), at which time they will join larger male-only herds that will migrate to polar waters to feed, and return back to tropical and temperate waters to breed (Whitehead, 2002). No global population estimates for sperm whales are available.

In Australia, sperm whales are most commonly found in deep waters (greater than 600 m) off the continental shelf of all Australian states (Bannister *et al.,* 1996). There are no population estimates for sperm whales in Australia, with information regarding their presence and distribution gathered from incidental sightings and stranding records (DotE, 2016f). Bannister *et al.*, (1996) considered it likely that they are more than tens of thousands of sperm whales in Australian waters.

Detailed information on the distribution of sperm whales off WA is not available, but the species is known to aggregate in a narrow area only a few miles wide at the shelf edge off Albany (DotE, 2016f), and between Cape Leeuwin and Esperance (over 1,500 km south of the field) (Bannister *et al.*, 1996). It is presumed that in WA, sperm whales are dispersed along the shelf edge and deeper offshore.

Considering the widespread distribution of sperm whales in deep waters, it is possible that sperm whales may occur in the ZPI. Sperm whales have been observed off the west coast of WA, however the only key locality recognised in WA is along the southern coastline (Bannister *et al.*, 1996). The closest listed BIA for the species is foraging grounds west of the Perth Canyon. This is over 900 km from the ZPI and Operational Area (DotE, 2016f). However, the absence of significant sightings in the region suggests numbers are likely to be low.

#### 1.3.1.10 Spotted Bottlenose Dolphin (Migratory)

The spotted bottlenose dolphin (*Tursiops aduncus*) can be found in the warm temperate to tropical waters of the Indo-Pacific ocean, from South Africa in the west, along the rim of the Indian Ocean to the southern half of Japan and southeast Australia in the east (Hammond *et al.*, 2008; Möller and Beheregaray, 2001). It is also found around oceanic islands distant from major land masses within this range.

Spotted bottlenose dolphins generally occur over shallow coastal waters on the continental shelf or around oceanic islands. They sometimes occur in mixed groups with

common bottlenose dolphins and other delphinid species. They feed on a wide variety of schooling, demersal and reef fishes, as well as cephalopods (Hammond *et al.*, 2008).

Few estimates of abundance have been made for this species, however recent reports estimate the population size offshore from WA (specifically around Shark Bay) to be at least 2,000-3,000 (Hammond *et al.*, 2008). Given the wide-ranging distribution this species may occasionally be sighted, albeit in low numbers.

The closest BIA to the ZPI is approximately 750 km north east at Roebuck bay, a region of tidal mangrove creeks, extensive tidal mudflats and rich and consistent prey availability, where calving, foraging and breeding for the spotted bottlenose dolphin is known to occur (DoEE, 2016b).

#### 1.3.1.11 Indo Pacific Humpback Dolphin (Migratory)

The Indo-pacific humpback dolphin *(Sousa chinensis)* is found along the northern Australian coast from Exmouth Gulf in the west to the Queensland-New South Wales border (DotE, 2016g). The species is most commonly observed in riverine, estuarine and coastal environments, in water less than 20 m deep but may also occur up to 55 km offshore (Bannister *et al.*, 1996). They have been recorded in a variety of shallow habitats including coastal lagoons, enclosed bays with mangrove forests and seagrass beds, to open coastal waters with rock/coral reefs.

As with the spotted bottlenose dolphin, the closest BIA to the ZPI is approximately 750 km north east at Roebuck bay, a region of tidal mangrove creeks, extensive tidal mudflats and rich and consistent prey availability, where calving, foraging and breeding for the Indo-pacific humpback dolphin is known to occur (DoEE, 2016b). Given the wide-ranging distribution this species may occasionally be sighted within the Operational Area or ZPI, albeit in low numbers.

#### 1.3.1.12 Dugong (Migratory)

Dugongs *(Dugong dugon*) are often found in shallow waters where seagrass beds flourish. Dugongs are migratory and are known to occur around the islands of the NWS, Shark Bay, Exmouth Gulf, the Dampier Archipelago and Ashmore Reef where seagrass beds occur (Gales *et al.,* 2004). However they do range further north and can be also found along the shelter waters of Indonesia (UNESCO, 2016b).

Dugongs are generally found in shallow waters protected from large waves or storms and have been observed along the east coast of Barrow Island and Varanus Island. Major recognised dugong aggregation (feeding) areas in WA include Shark Bay, Exmouth Gulf and Ningaloo Reef, and near islands of the Dampier Archipelago (Marsh *et al.,* 2002).

The nearest BIA for Dugongs is located along the Cape Range coastline and within the Exmouth Gulf area, intersecting the southmost extent of the ZPI and located roughly 100 km south of the Operational Area.

### 1.3.2 Marine Reptiles

Threatened and migratory marine reptiles within the Operational Area and ZPI are listed in Section 4.3 of the EP. Details on the species identified are included below..

#### 1.3.2.1 Short-Nosed Seasnake (Critically Endangered)

The short-nosed seasnake is endemic to Western Australia. The species prefers to inhabit reef flats or shallow waters along the outer reef edge in water depths to 10 m (Cogger, 2000; Guinea, 1993; McCosker, 1975). Individuals have been observed in daylight hours, resting beneath small coral overhangs or coral heads in water 1-2 m deep (McCosker, 1975). Guinea and Whiting (2005) reported that some short-nosed seasnakes may move up to 50 m away from the reef flat.

The short-nosed seasnake has been recorded from the Exmouth Gulf, Western Australia (Storr *et al.*, 2002) to the reefs of the Sahul Shelf, which lie in the eastern Indian Ocean. As there are no reefs or shallow waters in the Operational Area it is extremely unlikely the short nosed seasnake would be present. However, seasnakes may occur within the ZPI in shallow waters and reefs such as those bordering Barrow Island and Turquoise Bay.

#### 1.3.2.2 Marine Turtles

Threatened and migratory marine turtles within the Operational Area and ZPI are listed in Section 4.3 of the EP. Details on the species identified are included below.

Several species of marine turtles have also been recorded within the NWS and may migrate through the ZPI at various times during the year (DoEE, 2017).

Due to open oceanic conditions, there are no particular features that would result in feeding or breeding aggregations of turtle species within the Operational Area. However, internesting buffers and suitable nesting and mating habitat BIAs are located within the ZPI.

**Green Turtle (Vulnerable/Migratory)**

Green turtles (*Chelonia mydas*) are found in tropical and subtropical waters throughout the world. There are seven distinct genetic populations of green turtles in Australia, the largest of which nests in WA. This WA population is thought to be one of the largest green turtle populations worldwide (Limpus, 2009). Given the water depths in the Operational Area, the area is unlikely to represent important habitat for green turtles during any life history phase. There are significant habitats for green turtles within the ZPI around the west coast of Barrow Island and north coast of the Muiron Islands. The BIA that is associated with these habitats overlap with the ZPI.

Green turtle foraging habitats within WA are poorly described. In eastern Australia, juvenile and adult green turtles feed in intertidal and sub-tidal habitats, including coral and rocky reefs, seagrass meadows, algal turfs on sand or mud flats (Limpus, 2009) and it is likely that they feed in similar habitats within WA. Adult and juvenile green turtles are commonly observed feeding on turfing algae on the west coast of Barrow

Island within the ZPI (Pendoley, 2005) and are commonly observed over reef habitats within the 70 m isobath of the southern Pilbara region (RPS, 2010).

A major green turtle rookery is located on the west coast of Barrow Island within the ZPI. The Barrow Island rookery is estimated to support a total female reproductive population of 20,000 individuals. Green turtles nest on Barrow Island from October to March with a December–January peak (Pendoley, 2005). Mating generally occurs adjacent to the nesting beach, and mating turtles are regularly observed off the west coast of Barrow Island (Chevron Australia, 2009). Based on the known nesting season, mating at Barrow Island is likely to occur between September and November. Between nesting events, green turtles generally remain within 12 km of their nesting beach, and have been observed to remain within 5 km of nesting beaches on the west coast of Barrow Island (Pendoley, 2005). The Muiron Islands also support a major Green Turtle rookery (Limpus, 2004).

**Flatback Turtle (Vulnerable/Migratory)**

Flatback turtles (*Natator depressus*) are found only in the tropical waters of northern Australia, Papua New Guinea and Indonesia. There are four known genetic populations of this species, namely eastern Australia, Gulf of Carpentaria, western Northern Territory and WA (Limpus, 2009). The species is listed as Vulnerable (and Migratory) under the EPBC Act and Data Deficient under the IUCN Red List of Threatened Species.

Nesting is restricted to the northern Australian coastline, from Exmouth, WA, to Bundaberg, Queensland (Limpus, 2009). One of the largest known flatback turtle rookeries in WA is located along the east coast of Barrow Island, with a female reproductive population estimated to comprise approximately 3,900 turtles. A further 3,000 female flatback turtles are also found nesting on the nearby Lowendal and Montebello Islands; bringing the total estimated female reproductive population size for the Barrow-Montebello-Lowendal Island complex to 6,900 (Chevron Australia, 2009). Lesser numbers of flatback turtles are also known to nest on islands between Barrow Island and Exmouth, including Thevenard Island, Ashburton Island and Locker Island (Limpus, 2009; RPS, 2010).

The peak nesting season for flatback turtles in the southern Pilbara is from December–January (Pendoley, 2005; Chevron Australia, 2009) and the full nesting season is likely to extend from October–March (RPS, 2010). Based on the inferred nesting season, mating is likely to occur from about September–November each year. Flatback turtle mating areas in WA are unknown (Chevron Australia, 2009), but are likely to be near the nesting beaches (Hamann *et al.*, 2002).

Between nesting events, flatback turtles either remain near their nesting beach, or travel up to 70 km to the mainland of WA (Chevron Australia, 2009; RPS, 2010). Some flatback turtles that nest in the southern Pilbara migrate to the northern Pilbara/Kimberley at the end of the nesting season (Chevron Australia, 2009; RPS, 2010). These turtles generally remain within the 70 m isobath while in the vicinity of the Barrow-Montebello-Lowendal Island complex (Chevron Australia, 2009; RPS, 2010). Other flatback turtles that nest in the southern Pilbara remain there at the end of the nesting season (Chevron Australia, 2009; RPS, 2010).

Adults are known to inhabit soft bottom habitat and forage in turbid shallow near-shore water in areas 5 to 20 m deep (Limpus *et al.*, 1983). Recent satellite telemetry data suggests that areas of 20–100 m water depth between Barrow Island and the Muiron Islands may be important for flatback turtle foraging (RPS, 2010). Flatback turtles feed on invertebrates such as cuttlefish, jellyfish, soft corals, sea pens and holothurians (DotE, 2016h; Limpus, 2009) and are likely to be found foraging in habitats that support these organisms.

Considering the significant numbers of flatback turtles that occur in WA, it is possible that some may travel through the Operational Area on occasion, and the Operational Area and ZPI overlap with the BIA for the flatback turtle. Water depths in the Operational Area suggest the area is unlikely to comprise important habitat for the turtles during any life history phase of the species. However, the west coast of Barrow Island within the ZPI includes important foraging, nesting and mating habitat for flatback turtles.

**Hawksbill Turtle (Vulnerable/Migratory)**

Hawksbill turtles (*Eretmochelys imbricate*) are found in tropical, subtropical and temperate waters in all oceans of the world. The total population of hawksbill turtles in Australia is unknown. However, it is known that Australia holds the largest breeding populations of hawksbill turtles in the world, and the largest rookeries (DotE, 2016i). It is estimated that around 3,000 females nest in WA each year (DotE, 2016i).

Hawksbill turtles spend the first five to ten years of their life drifting on ocean currents (DotE, 2016i). During this pelagic phase, they are often found in association with rafts of Sargassum (DotE, 2016i). Once hawksbill turtles reach 30 to 40 cm in length, they settle to forage in tropical tidal and sub-tidal rocky and coral reef habitat. They have also been found, those less regularly, in coastal seagrass habitat and within the deep waters of trawl fisheries. Foraging areas for hawksbill turtles in WA are poorly described, however nesting hawksbill turtles from the Lowendal Islands and Dampier Archipelago have been tracked to presumed foraging grounds in the Pilbara region, including the De Grey River mouth, Great Sandy Island, the Mary Anne Islands and Nickol Bay, and Sholl Island (Pendoley, 2005). Hawksbill turtles feed primarily on sponges, but also forage on cephalopods, gastropods, cnidarians, seagrass and seaweed (Carr & Stancyk, 1975; Witzell, 1983; Limpus, 1992; Spotila, 2004) and are likely to be found foraging in habitats that support these organisms.

Nesting is mainly confined to tropical beaches (DotE, 2016i). The major nesting areas of hawksbill turtles in WA are the Dampier Archipelago, the Ningaloo and Jurabi Coasts, as well as Thevenard, Barrow, Lowendal and Montebello Islands.

The peak hawksbill turtle nesting season in the Pilbara is between October and December (Pendoley, 2005). Mating can therefore be expected to occur from about September–October and is likely to occur in shallow waters close to nesting beaches. The inter-nesting period is generally spent close to the nesting beach (Pendoley, 2005).

Hawksbill turtles occur a number of WA marine reserves (DotE, 2016i), which are managed to protect feeding grounds, nesting grounds and inter-nesting habitat (where

females occur during non-breeding times) for marine turtles in Australia, including the hawksbill turtle:

- Ashmore and Cartier Nature Reserves
- Ningaloo Marine Park
- Shark Bay World Heritage Area
- Dampier Archipelago Nature Reserve
- Thevenard Island Nature Reserve
- Barrow Island Nature Reserve
- Montebello Conservation Park
- Cape Range Conservation Park
- Muiron Islands Nature Reserve.

Average incubation periods for hawksbill turtle nests in northern Queensland are between 55 and 59 days (Limpus, 2009). Therefore, the peak hatching period in WA is expected to be between December and February. The in-water dispersal patterns and habitat use for hawksbill turtle hatchlings in WA are not known but it is likely that they travel to deep water, offshore habitats (Limpus, 2009).

The listed BIA associated with key hawksbill turtle nesting habitat lies within the ZPI on the west coast of Barrow Island and the Ningaloo Coast near Turquoise Bay. The listed BIA for inter-nesting habitat also lies within these areas and marine waters north of Thevenard Island.

**Loggerhead Turtle (Endangered/Migratory)**

Loggerhead turtles (*Caretta caretta*) are known to have a broad distribution (DotE, 2016q), occurring in proximity to coral and rocky reefs, seagrass beds and muddy bays throughout eastern, northern and Western Australia. Loggerhead turtles nest on sandy beach and the juvenile turtles spend their first several years adrift on the ocean currents. Once they become large enough, loggerhead turtles enter the benthic habitat to forage. Loggerhead turtles are carnivorous, feeding primarily on crustaceans and molluscs (Spotila, 2004) and are likely to be found foraging in areas that support high densities of these organisms.

The WA loggerhead turtle population nests on mainland beaches from Carnarvon to the Ningaloo Marine Park and offshore islands from Shark Bay to the Muiron Islands (Limpus, 2009). Very low density nesting occurs in other areas further north, including Locker Island and Ashmore Reef (Limpus, 2009).

Given the distance of the Operational Area from known loggerhead turtle rookeries and prospective foraging areas, it is unlikely that significant numbers of loggerhead turtles will be present at the location. However, the Muiron Islands loggerhead turtle rookery falls within the ZPI, and the ZPI spans inter-nesting BIAs for loggerhead turtles in waters near the Muiron Islands, the Ningaloo Coast near Turquoise Bay, and north of Barrow Island.

**Leatherback Turtle (Endangered/Migratory)**

The leatherback turtle (*Dermochelys coriacea*) has the widest distribution of any marine turtle species, and can be found in tropical, subtropical and temperate waters throughout the world (Marquez, 1990). Leatherback turtles are relatively rare in northern Australian waters. The species is more commonly observed in southern coastal waters around Australia.

No major breeding sites of leatherback turtles have been recorded in Australia (Limpus, 2009); however, scattered nesting occurs in the Northern Territory, along the coast of Arnhem Land. For example, low numbers of nesting females have been recorded at Cobourg Peninsula in north-west Arnhem Land (Chatto & Baker, 2008), with breeding occurring mostly during December and January.

Nesting occurs on tropical beaches and subtropical beaches (Marquez 1990) but no major centres of nesting activity have been recorded in Australia, although scattered isolated nesting (1-3 nests per annum) occurs in southern Queensland and Northern Territory (Limpus & McLachlin, 1994). However, leatherback turtles are the most pelagic of all marine turtles, and make long migrations between foraging areas and nesting beaches (DotE, 2016j).

Foraging, feeding or related behaviour is known to occur within the ZPI. Leatherback turtles may occasionally transit through the Operational Area and ZPI. However, given the distance from known leatherback turtle rookeries and prospective foraging areas, it is unlikely that significant numbers will occur at the location.

### 1.3.3 Fish, Sharks and Rays

The North West Cape region is considered an important area for fish and shark biodiversity in Australia. The Operational Area is located approximately 110 km north-east of the North West Cape, which marks a boundary for a transition between demersal tropically dominated shelf and slope fish communities to dominant temperate species communities (Last *et al.*, 2005; Commonwealth of Australia, 2012).

The benthic and pelagic fish communities of the Northwest Shelf Province are strongly depth-related, indicative of a close association between fish communities and benthic habitats (Commonwealth of Australia, 2012). Deep water fish species, such as goatfish, lizardfish, ponyfish, threadfin bream, adult trevally, billfish and tuna are found in areas where water depths range between 100–200 m.

Table 1-1 presents spawning aggregation times for key fish species within the North Coast bioregion.

**Table 1-1: Spawning aggregation times for key species within the North Coast bioregion (Dept of Fisheries)**

| Bioregion | Key Fish Species Within Zone | Spawning Aggregation Times |
|---|---|---|
| North Coast | Black shark (*Carcharhinus tilstoni and C. limbatus*) | Nov – Dec |
| | Goldband snapper (*Pristipomoides multidens*) | Jan – Apr |
| | Rankin cod (*Epinephelus multinotatus*) | Aug – Oct |
| | Red emperor (*Lutjanus sebae*) | Jan, Mar |
| | Pink snapper (*Pagrus auratus* (rare) | May – Jul |
| | Sandbank shark (*Carcharhinus plumbeus*) | Oct – Jan |
| | Spanish mackerel (*Scomberomorus commerson*) | Aug – Nov |

Threatened and migratory fish, shark and rays within the Operational Area and ZPI are listed in Section 4.3 of the EP. Details on the species identified are included below..

#### 1.3.3.1 Whale Shark (Vulnerable/Migratory)

The whale shark (*Rhincodon typus)* has a broad distribution in tropical and warm temperate seas, usually between latitudes 30°N and 35°S (Wilson *et al.*, 2001; Wilson *et al.*, 2006). Whale sharks are highly migratory and the species' movements are closely associated with productivity pulses, ocean circulation and water temperatures, although this is little understood (DoEE, 2016c). Whale shark presence coincides with the coral mass spawning period, when there is an abundance of food (krill, planktonic larvae and schools of small fish) in the waters adjacent to the reef.

The whale shark may occasionally feed within the Operational Area or ZPI and may travel through during migration. The foraging BIA (including high density prey) for the whale shark overlaps with both the Operational Area and ZPI.

#### 1.3.3.2 Longfin Mako Shark (Migratory)

The longfin mako shark (*Isurus paucus*) is an oceanic tropical species and is only rarely encountered globally (Reardon *et al.*, 2006). This species is believed to be cosmopolitan in tropical and warm temperate waters and common in the Western Atlantic and possibly the Central Pacific. However, its distribution in Australian waters is poorly known, with only sporadic sightings (Reardon *et al.*, 2006). This is in part due to confusion with the more common shortfin mako shark (Compagno, 2001). Due to the wide distribution range of the species and the absence of any recognised important habitat in the Operational Area or ZPI, the longfin mako shark is not expected to occur in the Operational Area or ZPI in significant numbers.

#### 1.3.3.3 Shortfin Mako Shark (Migratory)

The shortfin mako shark (*Isurus oxyrinchus*) is an active, offshore littoral and epipelagic species, found in tropical and warm-temperate seas from the surface down to at least 500 m, seldom occurring where water temperature is below 16 °C (Cailliet *et al.*, 2009). This species has been occasionally found close inshore where the continental shelf is narrow, and may occur from 20-50° between Australia and Chile, and to almost 60° south east of New Zealand (Reardon *et al.*, 2006). Due to the broad distribution of this species, they are unlikely to be found in significant numbers in the Operational Area or ZPI.

#### 1.3.3.4 Great White Shark (Vulnerable/Migratory)

The great white shark (*Carcharodon carcharias*) has a wide distribution, and is located throughout temperate and sub-tropical waters, from central Queensland, around the south coast and up to the north-west coast of Western Australia (DotE, 2016p). Great white sharks can be found from close to shore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas (DotE, 2016p). Although they typically occur between the coast and the 100 m depth contour, they have been observed diving to 1,000 m (Bruce *et al.*, 2006). Great White Sharks have been recorded travelling very large distances and do not seem to reside in one area (DotE, 2016p). They are transient within the NWMR as they are known to prey on humpback whales and have been recorded at the North West Cape waters during migration season. The great white shark is often found close in-shore and penetrates shallow bays in continental coastal waters. There is no BIA for the great white shark located within the vicinity of the Operational Area or ZPI, with the closest BIA being associated with the seal colony of the Houtman Abrolhos Islands off the coast of Geraldton, 600 km south of the ZPI (DoEE, 2016b).

Given the transient nature of great white sharks, and the lack of critical habitat present for this species, they are only expected to be present in low numbers in the Operational Area and ZPI, either transiting through or foraging in the area.

#### 1.3.3.5 Grey Nurse Shark (Vulnerable)

The Grey Nurse Shark *(Carcharias taurus*) has a wide-ranging in-shore distribution, focused around main continental landmasses in sub-tropical to cool, temperate waters. The species is often recorded near in-shore rocky reefs, rocky caves, islands and sandy-bottomed gutters. They have also been observed in the surf zone and close to

coral reefs. It is thought that this species is not restricted to any particular habitat. They tend to hover above the seabed at depths between 15 and 40 m. Grey Nurse sharks have also been recorded at depths of approximately 200 m on the continental shelf (Bennett & Bansemer 2004).

Grey nurse sharks have been recorded around most of the southern half of Australia and northwards to Shark Bay in WA (Cavanagh *et al.*, 2003). Within WA, grey nurse sharks are distributed along the coast and encountered with low and irregular frequency (DotE, 2016r). As the species occurs mainly on the south western-coastal waters (Chidlow *et al.*, 2006) it is considered unlikely to occur within the Operational Area or ZPI. There are no identified BIAs for the grey nurse shark on the west coast of Australia (DoEE, 2016b).

#### 1.3.3.6 Porbeagle, Mackerel Shark (Migratory)

The Porbeagle is wide-ranging and inhabits temperate, subarctic and subantarctic waters of the North Atlantic and Southern Hemisphere (Francis *et al.*, 2002). The porbeagle primarily inhabits oceanic waters and areas around the edge of the continental shelf. They occasionally move into coastal waters, but these movements are temporary (Campana & Joyce, 2002; Francis *et al.*, 2002). The porbeagle is thought to be reasonably flexible in the types of habitat used for foraging (Pade *et al.*, 2009). Due to the absence of any recognised important habitat in the Operational Area or ZPI, the porbeagle is not expected to occur in the Operational Area or ZPI in significant numbers.

#### 1.3.3.7 Dwarf Sawfish and Green Sawfish (both Vulnerable)

The green (*Pristis zijsron)* and dwarf sawfish (*Pristis clavata*) occur in in-shore coastal waters and riverine environments of tropical northern Australia (cited in DotE, 2016s; DotE, 2016t). The freshwater and green sawfish are widespread in the Indo-west Pacific, however the dwarf sawfish is known only from Australian waters.

Sawfish are usually observed along the north-west coast of WA down to the Pilbara region. Adult dwarf sawfish are known to migrate seasonally back into inshore waters (DotE, 2016t), although it is unknown how far offshore the adults travel. Dwarf sawfish commonly use the tidal creeks and mangrove areas of Roebuck Bay, for breeding and resting (Bennelongia, 2009).

Green sawfish have historically been recorded in the coastal waters off Broome, WA, around northern Australia and down the east coast as far as Jervis Bay, New South Wales (NSW) (DotE, 2016s). Green Sawfish migration patterns are unknown (DotE, 2016s). Green sawfish been recorded in inshore marine waters, estuaries, river mouths, embankments and along sandy and muddy beaches (DotE, 2016s). Green sawfish have been recorded in very shallow water (< 1 m) to offshore trawl grounds in over 70 m of water (DotE, 2016s).

There is no biologically important area for sawfish within the Operational Area or in the ZPI. The closest biologically important habitat for sawfish to the ZPI is 500 km to the north east.

#### 1.3.3.8 Narrow Sawfish (Migratory)

The narrow sawfish occurs from the northern Persian Gulf to Australia and north to Japan, inhabiting estuarine waters and nearshore waters up to depths of 100 m (D'Anastasi *et al.*, 2013). While population declines have been observed globally, the narrow sawfish is not currently listed as threatened. Northern Western Australia, the Northern Territory, the Gulf of Carpentaria and Queensland east coast waters comprise the most ecologically functional populations worldwide, however these populations are suspected to have declined significantly from historic levels (D'Anastasi *et al.*, 2013). Narrow sawfish are commonly captured as bycatch and are the most commonly caught species of sawfish within the Northern Prawn Fishery as of 2015 (NPF, 2015). The species is likely to occur within the Operational Area and ZPI, particularly in nearshore estuarine environments.

#### 1.3.3.9 Blind Gudgeon and Blind Cave Eel (Vulnerable)

The blind gudgeon and blind cave eel occur in limited distribution in the subterranean waters of the Cape Range Peninsula. The blind gudgeon may also occur at Barrow Island. Both vertebrate species are uniquely restricted to caves and groundwater, inhabiting fissures, wells and bores (Humphreys & Blyth, 1994). Few surveys have characterised the population numbers of each species, possibly due to the species' habitats being inaccessible or restricted. Typical numbers of blind gudgeons within a cave may vary between a few to about 100 individuals (Humphreys, 1999). The blind gudgeon has been sampled from caves with water depths up to 33 m, and from wells and bores in which the water table was <50 m below the ground surface (Humphreys, 1999). Both the blind gudgeon and blind cave eel have been found living in fresh and seawater conditions (Humphreys, 1999).

As both the blind gudgeon and blind cave eel live in caves and groundwater, it is highly unlikely that they would occur within the Operational Area. However, they may occur within the ZPI in caves and groundwater near the Cape Range Peninsula, and the blind gudgeon may also be present within the ZPI at Barrow Island.

#### 1.3.3.10 The Giant and Reef Manta Ray (Migratory)

Manta rays consist of two individual species; the giant manta ray (*manta birostris*) and the reef, or coastal manta ray (*manta alfredi*). The Giant Manta Ray is the largest ray species in the world and is found in tropical marine waters worldwide and only on occasion in temperate regions (DoF, 2011). The Giant Manta ray spends time on the surface, sometimes even jumping out of the water, and has also been observed diving to depths of over 1,000 metres (Arkive, 2016). The species is a seasonal visitor to coastal and offshore sites and is commonly recorded on productive coastlines with regular upwellings. Giant manta rays also visit shallow reefs to be cleaned by 'cleaner fishes' and to feed (Arkive, 2016).

Giant manta rays aggregate at Ningaloo Reef, in particular between March and April, predominately south of the ZPI, however they may also occur in the Operational Area and ZPI. Reef manta rays usually occur closer to shore, but there is no BIA for manta rays.

### 1.3.4 Seabirds/Shorebirds

Barrow, Lowendal and Montebello Islands are significant sites for migratory and resident seabirds and shorebirds (Commonwealth of Australia, 2012). Barrow, Lowendal and Montebello islands are internationally significant sites for six species of migratory shorebirds, supporting greater than 1% of the East Asian-Australasian Flyway populations of these species (Commonwealth of Australia, 2012). In addition, the Montebello/Barrow islands region is a significant rookery for at least 15 seabird species, with the largest breeding colony of Roseate tern in Western Australia found on the Montebello Islands (DEC, 2006).

Many of the species on the Montebello and Barrow islands are listed under the Japan-Australia Migratory Bird Agreement (JAMBA) and China migratory Bird Agreement (CAMBA) and it is expected that some individuals of these species would pass near the ZPI during their annual migration and may form temporary feeding aggregations, subject to food availability.

Threatened and migratory seabirds and shorebirds within the Operational Area and ZPI are listed in Section 4.3 of the EP. Details on the species identified are included below.

#### 1.3.4.1 Red Knot (Endangered/Migratory)

Distribution of the red knot in Western Australia is widespread, including the coast from Ningaloo and Barrow Island to the south-west Kimberly Division. Migration occurs to high northern latitudes during the northern hemisphere summer to breeding grounds where food is readily abundant, then southward to escape severe winter conditions under which energy demands are high and prey is scarce. Both Australia and New Zealand host significant populations of red knots during the non-breeding period (Bamford *et al.*, 2008). Important sites for the red knot in Western Australia include Eighty Mile Bay (population of 80,700) and Roebuck Bay (11,200) located over 500 km northwest of the ZPI (Bamford *et al.*, 2008). Similar to other migratory shorebirds, the red knot frequents intertidal sands, mudflats and coastal wetlands. As these habitats are not present within the Operational Area, occurrence of the species within the area is unlikely outside of brief migratory transit. However, the red knot may be present in these habitats within coastal areas of the ZPI during the non-breeding period. There is currently no BIA for this species.

#### 1.3.4.2 Curlew Sandpiper (Critically Endangered/Migratory)

The curlew sandpiper (*Calidris ferruginea)* is a slim, small sandpiper with a long neck and long legs. Within Australia, Curlew Sandpipers are widespread across coastal habitats and also quite broadly distributed inland. In Western Australia, Curlew Sandpipers are widespread on coastal and subcoastal plains between Cape Arid to the south-west Kimberley Division, and are more sparsely distributed between Carnarvon and Dampier Archipelago (DotE, 2016v). There is currently no BIA for the curlew sandpiper, however the species is known to occur within the Operational Area and ZPI.

#### 1.3.4.3 Bar-Tailed Godwit (Vulnerable/Migratory) and Northern Siberian Bar-

**Tailed Godwit (Critically Endangered/Migratory)**

The bar-tailed godwit is widely distributed in Western Australia around the coast from Eyre to Derby, with occasional sightings elsewhere in the Kimberly Division. Populations have also been found from Darwin and Melville Island east to Croker Island, within the Gulf of Carpentaria and at Alice Springs (Marchant & Higgins, 1993). Like other migratory species the bar-tailed godwit breeds in the northern hemisphere during summer and migrates southwards during winter. The critically endangered subspecies, the northern Siberian bar-tailed godwit, migrates from breeding grounds in central north Siberia to north-west Australia. Western Australia sites of international importance for the bar-tailed godwit include Eighty Mile Beach (population of 110,290) and Roebuck Bay (65,000) located over 500 km north west of the ZPI (Bamford *et al.*, 2008). Typical habitat for the species includes intertidal sandflats, mudflats and other coastal areas (Marchant & Higgins, 1993). The EPBC Protected Matters Search did not identify the occurrence of bar-tailed godwits within the Operational Area; however, the species may occur within the ZPI during non-breeding periods in favourable shoreline habitats.

### 1.3.4.4 Southern Giant-Petrel (Endangered/Migratory)

The southern giant-petrel is widespread throughout the Southern Ocean, breeding on six subantarctic and Antarctic islands within Australian territory. The worldwide population of the species is estimated at 62,000 individuals and is in continued rapid decline (DotE, 2016k). There are an estimated 7090 breeding pairs within Australian territory. In summer, it occurs predominantly in subantarctic to Antarctic waters, dispersing north during winter towards the Tropic of Capricorn, located south of the Operational Area and ZPI. The southern giant-petrel is an opportunistic feeder, scavenging in coastal and island environments and surface seizing in open water environments (DotE, 2016k).

The only BIA for this species is on the east coast of Australia along the New South Wales coastline, which is listed as foraging habitat (DoEE, 2016b). Given that the northernmost extent of this species' described distribution does not overlap with the Operational Area, the southern giant petrel is not expected to be present in significant numbers within either the Operational Area or the ZPI.

### 1.3.4.5 Eastern Curlew (Critically Endangered/Migratory)

The eastern curlew (*Numenius madagascariensis)* is Australia's largest shorebird. It is a long-haul flyer and easily distinguished by its long, downwards curving bill. The Eastern Curlew breeds in the Northern Hemisphere and arrives in Australia in August to forage for crabs and molluscs in intertidal mudflats (DotE, 2016n). It may transit through the area and could be expected to be occasionally sighted within the Operational Area and ZPI. Suitable habitat for the eastern curlew within the ZPI is located on Barrow Island, the Ningaloo Coast, within Exmouth Gulf and along the shoreline of the Pilbara coast. Other foraging breeding areas near the ZPI include Lowendal Island and the Montebello Islands. The closest habitat, on Barrow Island, is located over 35 km away from the Operational Area. There is no BIA for this species.

#### 1.3.4.6 Soft-Plumaged Petrel (Vulnerable)

The soft-plumaged petrel is a marine species which occurs over the temperate and subantarctic waters of the South Atlantic, southern Indian and western South Pacific oceans. In the southern Indian ocean, occurrence is common between latitudes of 30° to 50° and at seas south-west of Australia (Marchant & Higgins, 1990). No confirmed breeding areas for the soft-plumaged petrel are located in Western Australia (Wiltshire *et al.*, 2004; Way *et al.*, 2009). The species is not known to occur within the Operational Area, with the southwest-most extent of the ZPI narrowly overlapping with its northmost listed distribution area at the North West Cape. The nearest BIA for the soft-plumaged petrel (foraging) is south of Geraldton, over 800 km south of the ZPI. Due to its preference for southern latitudes, and location of the nearest BIA, occurrence of the soft-plumaged petrel within the ZPI is considered unlikely.

#### 1.3.4.7 Australian Fairy Tern (Vulnerable/Migratory)

The Australian fairy tern (Sternula nereis nereis) feeds almost entirely on fish, foraging in in-shore waters around sheltered islands where it nests on sandy beaches. The ZPI lies within the foraging and breeding BIA for the fairy tern (DoEE, 2016b). These areas include Barrow Island, the Ningaloo Coast near Turquoise Bay and the marine waters near Thevenard Island. While outside the ZPI, the nearby Montebello Islands are also an important breeding and foraging location for the species. The species also has breeding grounds listed as BIAs on the Exmouth Peninsula within the Ningaloo Marine Park and on the mainland coastline 60 km south of Dampier (DoEE, 2016b).

#### 1.3.4.8 Albatrosses

A number of albatross species may forage in the area; White-capped Albatross, Tasmanian Shy Albatross and Black-browed Albatross (refer Section 4..3 of the EP).

Breeding colonies of albatross species are found at six localities within Australian waters, all of which are sub-Antarctic islands located in the Southern Ocean, several thousand kilometres from the Operational Area. All species of albatross forage widely at sea and are generally found at their most northern extents between May and September, with many species occurring at relatively low densities waters along the southern Australian coast during this time.

There are no critical habitats for any species of albatross listed under the EPBC Act within the Operational Area or ZPI; the nearest BIA for the identified albatross species lies over 500 km south of the ZPI. Given the oceanic foraging strategies of these species, foraging individuals may occur within the ZPI but are not expected in large numbers.

#### 1.3.4.9 Common Noddy (Migratory)

The common noddy is distributed in tropical and sub-tropical waters off the west, north and east coasts of Australia and is also widespread across tropical areas of the Atlantic, Indian and Pacific oceans. The species breeds on islands in colonies and will stay nearby during breeding season, moving out to sea during non-breeding periods (Higgins & Davies, 1996). Breeding patterns differ between sites from annual, to twice per year in spring/early summer and autumn, to throughout the year on certain islands (King *et al.*, 1992). Common habitats during breeding periods are rocky islets and stacks, and

shoals or cays of coral or sand, with foraging occurring in waters surrounding the nest. During non-breeding periods, the species is commonly found throughout the pelagic zone (Higgins & Davies, 1996).

The species is unlikely to occur within the Operational Area, aside from occasional transit through the area during migration. Occurrence within the ZPI is likely, particularly near coastal islands and offshore. However, the nearest BIA for the common noddy (foraging) is over 650 km south of the ZPI in waters off the coast of Geraldton.

#### 1.3.4.10 Fork-Tailed Swift (Migratory)

The fork-tailed swift is native to over 30 countries and occurs in all Australian states and territories outside of breeding periods (Birdlife International, 2009). The species is widely distributed in Western Australia from coastal and subcoastal areas between Augusta and Carnarvon (including islands), to the Pilbara and Kimberly regions, the north and north-west Gascoyne region, along the south coast and within Timor Sea (Higgins, 1999). The fork-tailed swift leaves breeding grounds in Siberia in August-September for warmer climactic conditions, with some populations arriving in Western Australia around October-November. The species is typically present in the Pilbara region from September to late April when they depart northwards (Higgins, 1999). Although almost exclusively aerial, including roosting, the species mostly occurs over inland plains, cliffs, beaches and dry/open habitats, foraging aerially for insects (Higgins, 1999). There is currently no BIA for the fork-tailed swift, however they are likely to be present within the Operational Area and ZPI, particularly near land and during migratory periods.

#### 1.3.4.11 Flesh Footed Shearwater (Migratory)

The flesh footed shearwater is common to waters of the continental shelf and continental slope off south-western WA (DotE, 2016u). Most breeding populations within Australian jurisdiction are poorly known (DotE, 2016u), though breeding occurs from late August to mid-May on islands off the south and south-west coast of WA, South Australia and NZ. The species then migrates northward at the completion of the breeding season to waters off Korea, Japan and Russia and return again by the end of September (DotE, 2016u). There are no BIAs for the flesh footed shearwater in the vicinity of the Operational Area or ZPI. The closest BIA is an aggregation off the coastline of Western Australia between Perth and Bunbury (DoEE, 2016).

#### 1.3.4.12 Wedge-Tailed Shearwater (Migratory)

The wedge-tailed shearwater is widely distributed between latitudes 35°N and 35°S, breeding at locations throughout the tropical Pacific and Indian oceans and the east and west coasts of Australia (del Hoyo *et al.*, 1992). The species frequently occurs over pelagic waters where it forages near the surface, and is found in colonies in burrows on offshore islands or atolls when nesting (del Hoyo *et al.*, 1992). Breeding seasons are highly variable depending on location (del Hoyo *et al.*, 1992). The Operational Area and ZPI fall within the breeding and foraging BIA for the wedge-tailed shearwater.

#### 1.3.4.13 Streaked Shearwater (Migratory)

The streaked shearwater is distributed throughout the western Pacific, breeding on islands off the coast of China, North Korea, South Korea and at the coast or offshore islands of Japan and Russia (del Hoyo *et al.*, 1992, BirdLife International, 2017). Breeding occurs during March in colonies, typically within burrows on forested hills. During the northern hemisphere winter, the species migrates south to the coasts of Australia, New Guinea, the Philippines, Vietnam, Sri Lanka and southern India (del Hoyo *et al.*, 1992, BirdLife International, 2017). Foraging occurs over pelagic and inshore waters, from which the species seizes food from just below the surface (del Hoyo *et al.*, 1992). There is currently no BIA for the streaked shearwater. However, it is likely to occur within the Operational Area and ZPI during non-breeding periods.

#### 1.3.4.14 Lesser Frigatebird (Migratory)

The lesser frigatebird is native to numerous countries between latitudes 30°N and 20°S, with significant breeding populations found in tropical waters of the Indian and Pacific oceans (del Hoyo *et al.*, 1992). Individuals disperse throughout tropical seas during non-breeding periods, foraging in marine waters for fish and squid. The species' preferred breeding habitat is on remote tropical and sub-tropical islands, within bushes and mangroves or on bare ground (del Hoyo *et al.*, 1992). The Operational Area and ZPI comprise favourable habitats for the lesser frigatebird, therefore it is expected to occur within these areas. The nearest BIA for the species (breeding and foraging) is over 250 km east of the ZPI.

#### 1.3.4.15 Great Frigatebird (Migratory)

The great frigatebird is widespread and breeds on numerous tropical islands (Nelson 2005). Within the North-west Marine Region, it breeds in small numbers on Ashmore Reef (Kimberley Birdwatching, 2004). This species is pelagic although breeding birds probably forage within 100-200 kilometres of the colony during the early stages of the breeding season (Nelson, 2005). The ZPI comprise favourable habitats for the great frigatebird, therefore it is expected to occur within the ZPI.

#### 1.3.4.16 Caspian Tern

Widespread in coastal regions, from the Great Australian Bight to the Dampier Peninsula. There are sparse records on the coasts east of King Sound and in eastern regions (Higgins & Davies 1996). Breeding occurs from the Recherche Archipelago to Dirk Hartog Island and Faure Island in Shark Bay, and also in the Pilbara region from around Point Cloates to North Turtle Island, and more rarely, in the Kimberley (Higgins & Davies 1996).

#### 1.3.4.17 Bridled Tern

Breeding is widespread from islands off Cape Leeuwin (extending round the southern coast to Seal Rocks) north to Shark Bay and in Pilbara region and Kimberley Division. At sea, distribution extends from Cape Leeuwin north to Dirk Hartog Island, with isolated mainland coastal records at Point Maud and Ningaloo, and from Barrow Island to the Dampier Archipelago, and at sea off the Kimberley coast from waters west of the Dampier Peninsula. Birds breed late spring to summer, with eggs recorded from mid-

October to late January, and young from mid-December to early March (Garavanta & Wooller 2000).

#### 1.3.4.18 Roseate Tern

The roseate tern is regularly recorded north from Mandurah to around Eighty Mile Beach, in the Pilbara Region. Breeding in Western Australia occurs in two quite distinct periods, with peak months for laying April to November (Higgins & Davies 1996).

#### 1.3.4.19 Sandpipers (all Migratory)

**Common Sandpiper**

The common sandpiper has a wide breeding distribution, ranging from eastern Russia to western Europe, and is found throughout Australia, south and south-east Asia and Africa (except near the equator) during non-breeding periods (Bamford *et al.*, 2008). Breeding occurs during May-June, with southward migration between mid-July and August until a return to breeding grounds around April (del Hoyo *et al.*, 1996). During non-breeding periods, the species inhabits inland wetland and coastal areas, such as estuaries, streams, pools, tidal creeks and freshwater seeps on coastal shores, but typically avoids large coastal mudflats (del Hoyo *et al.*, 1996; Snow and Perrins, 1998; Yalden, 1992). The common sandpiper is unlikely to occur within the Operational Area except during migratory movements, but may occur during non-breeding periods at wetland and coastal areas within the ZPI.

**Sharp-Tailed Sandpiper**

The sharp-tailed sandpiper migrates southward from its breeding grounds across Asia to Australia, Indonesia, New Guinea and China where it resides during the northern hemisphere winter, with over 90% of the non-breeding population occurring in Australia (Bamford *et al.*, 2008). The non-breeding distribution within Australia is widespread with the species occurring in ephemeral wetlands inland, foraging within mudflats and grasslands (Bamford *et al.*, 2008). The sharp-tailed sandpiper is only expected to occur within the Operational Area during migratory transit; however, it may occur within wetland and mudflat areas of the ZPI during non-breeding seasons.

**Pectoral Sandpiper**

The pectoral sandpiper breeds during the northern hemisphere summer in northern Russia and North America before migrating southwards. The species is transient through the Caribbean and Central America, moving to non-breeding habitats within South America and the tropical Pacific (Higgins & Davies, 1996). The species is rarely observed in Western Australia, but has been recorded at some locations including the coastal Gascoyne, the Pilbara and Kimberly regions between September-June (Higgins & Davies, 1996). The pectoral sandpiper typically found near coastal habitats but is occasionally found further inland. It inhabits bays, lagoons, estuaries, creeks, swamps, lakes, saltmarshes, floodplains and wetlands with low, emergent or fringing vegetation (Higgins & Davies, 1996). Foraging occurs in soft mud and shallow waters. As the species prefers coastal and inland habitats, it is not expected to occur within the Operational Area outside of migratory movements, but is expected to occur in favourable habitats within the ZPI.

#### 1.3.4.20 Oriental Plover (Migratory)

The oriental plover breeds in Mongolia and northern China during the northern hemisphere summer, with most of the population inhabiting northern Australia during the non-breeding period (Bamford *et al.*, 2008). There are many sites of international importance for the oriental plover in Western Australia, including Eighty Mile Beach (maximum population count 57,619), Port Hedland (29,900), Lake Gregory (25,707), Roebuck Bay (8,700) and Dampier (1,833) (Jaensch, 1994; Lane, 1987; Minton *et al.*, 2003; Watkins, 1993). Dampier is the nearest site to the ZPI, about 130 km east. The species has been observed throughout the northwest coast between Exmouth Gulf and Derby in Western Australia (Barrett *et al.*, 2003; Blakers *et al.*, 1984; Garnett, 1989; Lane, 1987; Marchant & Higgins, 1993; Stewart *et al.*, 2007). On arrival to Australia, the species inhabits coastal areas including estruaine mudflats, sandbanks, beaches and near-coastal grasslands (Bigg, 1981; Bransbury, 1985; Crawford, 1972; Murlis *et al.*, 1988; Serventy & Whittell, 1976; Storr, 1977, 1980, 1984). After a few weeks, the oriental plover disperses inland to flat, semi-arid or arid grasslands interspersed with hard grounds such as claypans and dry paddocks (Boekel, 1980; Carruthers, 1966; Close, 1982; Fletcher, 1980; Pedler, 1982; Storr, 1980). No BIAs currently exist for the oriental plover, but it is expected to occur within the ZPI based on observational records, with potential seasonal transit over the Operational Area.

#### 1.3.4.21 Oriental Pratincole (Migratory)

The breeding distribution of the oriental pratincole is widespread, spanning east to south Asia, from eastern China west to north India and Pakistan, to the Malay Peninsula in the south, as well as on islands in south Japan, the Philippines and Sumatra (Bamford *et al.*, 2008, Higgins & Davies, 1996). The oriental pratincole on the Indian subcontinent is non-migratory, with most of the eastern populations spending the non-breeding period in Australia (Bamford *et al.*, 2008). There are two sites of international importance for the oriental pratincole in Australia: Eighty Mile Beach (maximum population count 2,880,000) and Roebuck Plains (50,000) located over 500 km east of the ZPI (Bamford *et al.*, 2008). Within Australia, the species usually inhabits terrestrial water sources, floodplains, open plains and short grasslands, but may also occur in coastal environments (Bravery, 1970; Carruthers, 1968; Garnett, 1986; Jaensch, 2004; Klapste, 1977). The oriental plover is expected to occur in the ZPI during non-breeding periods, and may be transient over the Operational Area during migration. There is currently no BIA for the species.

#### 1.3.4.22 Osprey (Migratory)

The osprey is a species that may occur in the area, but is currently not listed as threatened under the EPBC Act. It is distributed across Australia, and there is currently no BIA for the species. The taxonomy of the osprey has been contested, with the most widely accepted being one species, with four subspecies, however the eastern osprey *Pandion cristatus* may also be recognised as its own species (DotE, 2016x). There are no published estimates on the population of the ospreys, and only well surveyed in NSW and South Australia. However it is known that they are common across Australia.

#### 1.3.4.23 Common Greenshank (Migratory)

The common greenshank breeds in latitudes between 70° N and 50° N including Eurasia, the northern British Isles, Scandinavia, east Estonia and north-east Belarus and some areas within Russia and northern Ukraine (Higgins & Davies, 1996). Southward migration occurs over the Yellow Sea and Japan, usually between July-September with migratory populations living in Australia between August-April (Bamford *et al.*, 2008; Higgins & Davies, 1996). In Western Australia, the species has been recorded from Cape Arid in the south to Carnarvon in the northwest along the coast, as well as the Kimberleys (Higgins & Davies, 1996). Sites of international importance for the common greenshank within Western Australia include Eighty Mile Beach (maximum population count 2,440), Roebuck Bay (1,000) and Wilson Inlet (568), with the nearest site Eighty Mile Beach located more than 500 km northwest of the ZPI (Bamford *et al.*, 2008; Watkins 1993). The species typically inhabits inland wetlands and sheltered coastal habitats with large mudflats, saltmarsh, mangroves or seagrass, and is known to forage at wetland fringes, within soft muds on mudflats, at the fringe of waterbodies or in shallows or channels (Higgins & Davies, 1996). The common greenshank is expected to occur in sheltered coastal habitats in the ZPI during non-breeding periods and may temporarily move through the Operational Area during migration. No BIA currently exists for the species.

## 1.4 Cultural and Socio-Economic Environment

### 1.4.1 Commercial Fisheries

Commercial fisheries that operate in the waters of the NWS are centred in Onslow, 65 km to the south of the field; Exmouth, 120 km to the southwest, and Dampier, approximately 180 km to the east. The focus of commercial fishing activity is mainly the inner continental shelf and waters surrounding the offshore islands to depths of about 30 m. Commonwealth and State Managed Fisheries that overlap the ZPI are summarised below.

### 1.4.2 Commonwealth Fisheries

#### 1.4.2.1 Western Tuna and Billfish Fishery

The Commonwealth managed Western Tuna and Billfish Fishery (WTBF) overlaps with the Operational Area and ZPI, occupying a large area of the Australia Fishing Zone, extending westward from Cape York Peninsula (142°30' E) off Queensland to 34°S off the west coast of Western Australia. It also extends eastward from 34°S off the west coast of WA, across the Great Australian Bight to 141°E at the South Australian/Victorian border (AFMA, 2012).

The WTBF also includes Australian waters outside of 12 nautical miles off Christmas Island and Cocos Keeling Islands. The WTBF Management Plan also applies to Australian vessels fishing on the high seas within the Indian Ocean Tuna Commission's (IOTC) Area of Competence (AFMA, 2012).

The 4 target species include Albacore Tuna (*Thunnus alalunga*), Bigeye tuna (*Thunnus obesus*), yellowfin tuna (*Thunnus albacares*), and broadbill sword fish (*Xiphius gladius*).

The target species of the WTBF are highly migratory and internationally managed by the Indian Ocean Tuna Commission (IOTC).

Pelagic trawling is the main fishing method used in the WTBF; including the methods of pelagic longline, minor line (hand line, rod and reel, troll and poling) and purse seine. Most longliners that have operated in the WTBF have been 15-30 m long and have deployed monofilament longline gear.

352 tonnes of catch were landed in the 2013 season from four vessels using pelagic long lines (ABARES, 2014). This reduced to 316 tonnes of catch in 2014 from the same vessel effort (ABARES, 2015). Catch mainly consisted of striped marlin, swordfish, albacore, bigeye tuna and yellowfin tuna. Some fishing effort overlapped with the operational and regional areas in the 2013 season (ABARES, 2014); however, in recent years, effort has concentrated off south-west Western Australia, between Geraldton and Bunbury, over 740 km south of the ZPI (ABARES, 2015, 2017).

There is one active licence holder in the Western Tuna and Billfish Fishery, Ray Davies of Ocean Wild Tuna, who was consulted in March 2019.

Due to the low levels of effort in this fishery (fewer than five vessels active in the fishery each year since 2005 (ABARES, 2017)), the large area the fishery encompasses, concentration of fishing effort far south of the ZPI, and the PSZ that has been in place for the duration of the Woollybutt Field operations, it is unlikely that significant fishing effort coincides with the Operational Area or ZPI.

#### 1.4.2.2 North West Slope Trawl Fishery

The North West Slope Trawl Fishery extends from 114°E to about 125°E off the Western Australian coast between the 200 m isobath and the outer limit of the AFZ, but taking into account Australian-Indonesian maritime boundaries. This fishery also encompasses Ashmore/Cartier and Scott Reefs. The North West Slope Trawl Fishery overlaps with the ZPI. The catch effort records for 2013 to 2014 show that catch effort was concentrated north of Barrow Island, outside of the ZPI (ABARES, 2015).

The North West Slope Trawl Fishery primarily targets Australian scampi (*Metanephrops australiensis*), velvet scampi (*M. velutins*) and boschmai scampi (*M. Boschmai*). The majority of fishing effort is targeted around the 200 m isobath (AFMA 2008), which coincides approximately with the south-eastern boundary of the fishery management zone. Figure 1-3 and Figure 1-4 shows the 2016 fishing effort was more than 100 km north of Barrow Island. Participation in the fishery is typically opportunistic or part-time, with the most effort taking place during seasonal closures on the federally managed Northern Prawn Fishery.

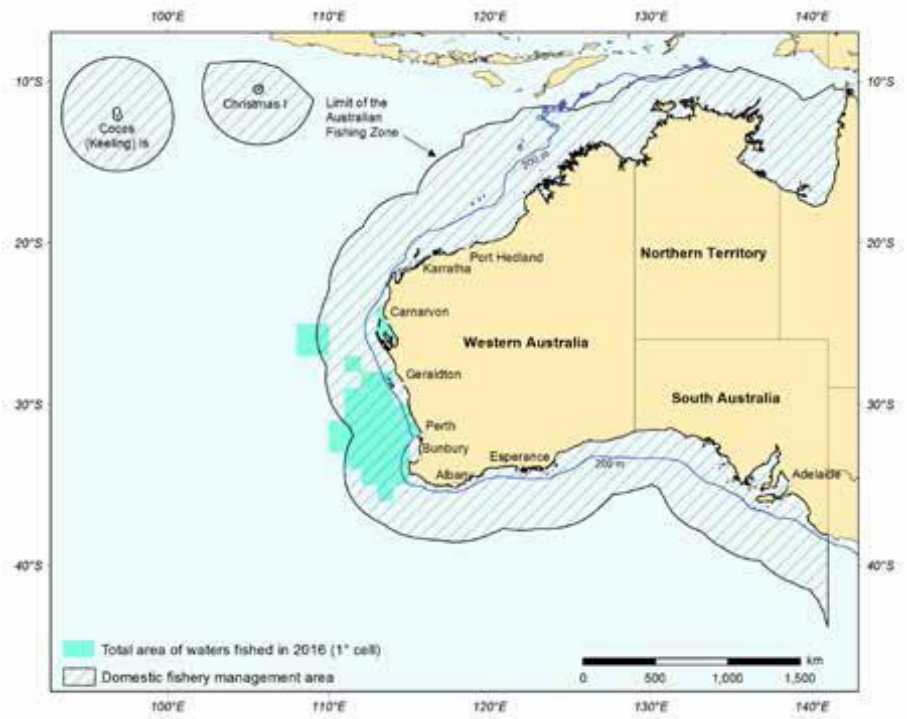



**Figure 1-3: Area of the Western Tuna and Billfish Fishery and 2016 fishing effort (ABARES, 2017)**

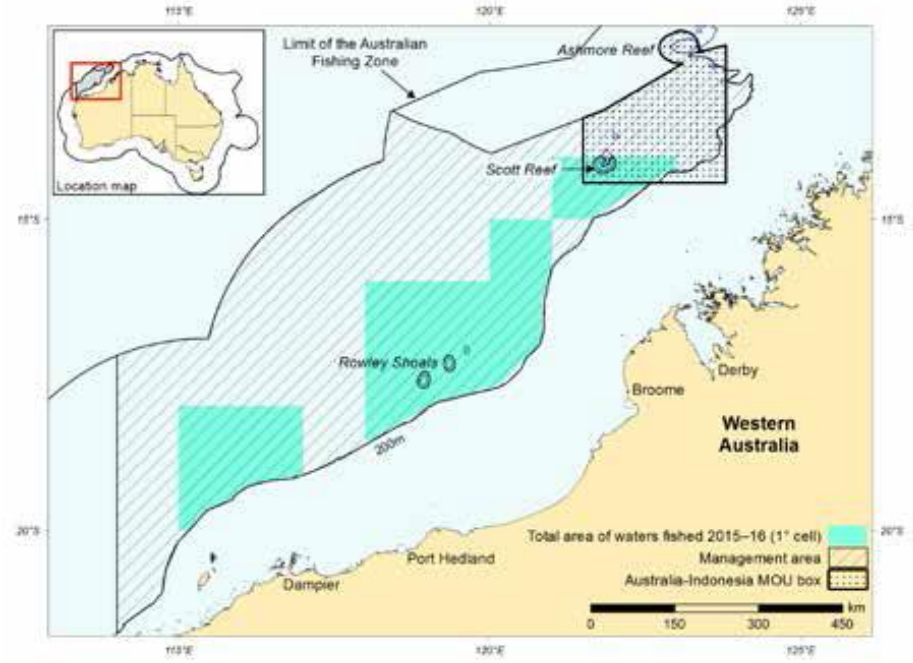



**Figure 1-4: Area of the North West Slope Trawl Fishery and 2016 fishing effort (ABARES, 2017)**

#### 1.4.2.3 Southern Bluefin Tuna Fishery

Although the area is licensed as part of the federally managed Southern Bluefin Tuna fishery, fishing does not occur within the Operational Area or the ZPI. Spawning of southern bluefin tuna (*Thunnus maccoyi)* has been recorded on the North West Shelf from September to March and larvae are likely to be abundant in surface waters of the region throughout these months (Collette & Nauen, 1983; Davis *et al.*, 1990). Adult southern bluefin tuna may migrate through the region to the Southern Ocean, which is a key fishing ground for the Southern Bluefin Tuna Fishery.

#### 1.4.2.4 Western Deepwater Trawl Fishery

The Western Deepwater Trawl Fishery targets a number of deep water, demersal finfish and crustacean species. The fishery is located in deep water off WA, seaward from the line approximating the 200 m isobath to the edge of the Australian Fishing Zone (AFZ). The fishery overlaps with the ZPI, but is almost 100 km east of the Operational Area.

Although the size of the fishery is extensive, most of the fishing effort is south and offshore of the North West Cape, with areas of medium and high density fishing activity located to the south of Ningaloo Reef and west of Shark Bay, beyond the 200 m isobath (Woodhams and Bath, 2016b). Fishing effort in recent years has been low with catch statistics indicating that no vessels were active in the fishery in 2014/15 (Woodhams and Bath, 2016b). Given recent fishing effort and fishing activity only occurring in waters deeper than 200 m, interactions with fishers are not expected.

#### 1.4.2.5 Western Skipjack Fishery

The Western Skipjack Fishery extends westward from the South Australian-Victorian border across the Great Australian Bight, around the west coast of WA to Cape York Peninsula. Effort in this fishery is mainly confined to the southern coast of Australia, well outside of the ZPI. In recent years there has been very little activity; no vessels were reported in 2015 (Patterson and Bath, 2016). As such, interactions with fishers are not expected.

### 1.4.3 State Fisheries

State-managed fisheries within the Operational Area are listed in Section 4.4.3 of the EP.

## 1.5 Values and Sensitivities

### 1.5.1 World Heritage Areas

There are no World Heritage Areas (WHA) within the Operational Area. There is one WHA within the ZPI, the Ningaloo Coast, which is also inscribed on the National Heritage List and is a State Marine Protected Area (DoEE, 2019).

#### 1.5.1.1 Ningaloo Coast

The Ningaloo WHA encompasses the Ningaloo Marine Park (Section 1.5.5.2) and Muiron Islands Marine Management Area (Section 1.5.6.1) which sustain and protect a series

of interconnected habitats. The statement of Outstanding Universal Value for the Ningaloo Coast WHA was based on the following natural criteria (DoEE, 2019):

**Criterion (vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance**

The landscapes and seascapes of the property are comprised of mostly intact and large-scale marine, coastal and terrestrial environments. The lush and colourful underwater scenery provides a stark and spectacular contrast with the arid and rugged land. The property supports rare and large aggregations of whale sharks (*Rhincodon typus*) along with important aggregations of other fish species and marine mammals. The aggregations in Ningaloo following the mass coral spawning and seasonal nutrient upwelling cause a peak in productivity that leads approximately 300-500 whale sharks to gather, making this the largest documented aggregation in the world.

**Criterion (x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation**

In addition to the remarkable aggregations of whale sharks the Ningaloo Reef harbours a high marine diversity of more than 300 documented coral species, over 700 reef fish species, roughly 650 mollusc species, as well as around 600 crustacean species and more than 1,000 species of marine algae. The high numbers of 155 sponge species and 25 new species of echinoderms add to the significance of the area. On the ecotone, between tropical and temperate waters, the Ningaloo Coast hosts an unusual diversity of marine turtle species with an estimated 10,000 nests deposited along the coast annually.

The Ningaloo Coast WHA is an area of outstanding conservation value, supporting a rich array of habitats and a diverse and abundant marine life (DoEE, n.d.). Marine habitats present include mangroves, lagoons, coral reef, open ocean, continental slope and the continental shelf (CALM, 2005). The dominant feature of the Ningaloo Coast WHA is Ningaloo Reef, which supports both tropical and temperate species of marine fauna and flora and more than 300 species of coral (CALM, 2005).

The Ningaloo Coast WHA provides important nesting habitat for four species of marine turtle found in WA. The North West Cape and Muiron Islands are important nesting sites for loggerhead turtles (Department of Environmental Protection, 2001). The North West Cape is also a major nesting habitat for hawksbill and green turtles (DEC, 2008). Less significant nesting sites are found on the Muiron Islands for flatback and hawksbill turtles (DEC, 2008).

Each year, the largest congregation of whale sharks anywhere in the world takes place off the coast of the Ningaloo WHA between March and July, coinciding with the annual mass coral spawning events.

The statement of integrity for the property states that both the marine and the terrestrial areas of the property may face a number of threats to the property's integrity. In particular, potential off-shore hydrocarbon extraction in the region surrounding the property requires careful consideration in order to prevent potential pollution and

disturbance. The coastline's significant length and remoteness poses major challenges to responses to pollution incidents suggesting a need for further investments in emergency response (DoEE, 2019).

### 1.5.2 National Heritage Areas

The Ningaloo Coast is National Heritage Place (NHP) that is also a WHA that is described in Section 1.5.1.

### 1.5.3 Commonwealth Heritage

There is one Commonwealth Heritage Area, Ningaloo Marine Area – Commonwealth Waters located 91 km to the south west of the Operational Area. It overlaps the Ningaloo Australian Marine Park which is described in Section 1.5.5.

### 1.5.4 Wetlands of International or National Importance

There are no wetlands of international or national importance within the Operational Area or the ZPI, according to a search undertaken using the EPBC Protected Matters Search Tool (DoEE, 2019).

### 1.5.5 Australian Marine Parks

The Operational Area does not overlap with any Australian Marine Parks (AMP), although three occur within the ZPI; Gascoyne AMP, Ningaloo AMP and Montebello AMP.

The North-West Marine Parks Network Management Plan 2018 (DNP, 2018) provides for the management of the network of Australia Marine Parks (AMP) in the North-West Network. The plan states that detailed implementation plans will be developed in the future to set out management actions and identify performance indicators for the North-West Network. However, the plan assigns an IUCN category to each marine park of the North-west Network, divides some marine parks into zones with their own category and sets out the objectives for each zone. Zoning takes into account the purposes for which the marine parks were declared, the objectives of the plan, the values of the marine park, and the requirements of the EPBC Act and EPBC Regulations. The management approach applied to activities within these zones are also described in the plan. While the Operational Area does not overlap any AMP, the AMP do overlap the ZPI. The plan states that actions required to respond to oil pollution incidents, including environmental monitoring and remediation, in connection with mining operations authorised under the OPGGS Act, may be conducted in all zones without an authorisation issued by the Director, provided that the actions are taken in accordance with an environment plan that has been accepted by NOPSEMA, and the Director is notified in the event of oil pollution within a marine park, or where an oil spill response action must be taken within a marine park, so far as reasonably practicable, prior to response action being taken.

#### 1.5.5.1 Gascoyne Australian Marine Park

The Gascoyne AMP is included in the North-West Marine Park Network Management Plan 2018 (DNP, 2018) which provides an overview of the significance and values of the AMP (Table 1-2).

**Table 1-2: Gascoyne AMP significance and values**

| **Overview** |
|---|
| The Gascoyne Marine Park is located approximately 20 km off the west coast of the Cape Range Peninsula, adjacent to the Ningaloo Reef Marine Park and the Western Australian Ningaloo Marine Park, and extends to the limit of Australia's exclusive economic zone. The Marine Park covers an area of 81,766 km² and water depths between 15 m and 6000 m.<br>The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Gascoyne Marine Park on 9 October 2017. The Marine Park is assigned IUCN category IV and includes three zones assigned under this plan: National Park Zone (II), Habitat Protection Zone (IV) and Multiple Use Zone (VI). |
| **Statement of Significance** |
| The Gascoyne Marine Park is significant because it contains habitats, species and ecological communities associated with the Central Western Shelf Transition, Central Western Transition, and Northwest Province.<br>It includes four key ecological features:<br>Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (valued for unique seafloor features with ecological properties of regional significance).<br>Commonwealth waters adjacent to Ningaloo Reef (valued for high productivity and aggregations of marine life).<br>continental slope demersal fish communities (valued for high levels of endemism and diversity).<br>the Exmouth Plateau (valued as a unique seafloor feature with ecological properties of regional significance).<br>The Marine Park includes some of the most diverse continental slope habitats in Australia, in particular the continental slope area between North West Cape and the Montebello Trough. Canyons in the Marine Park link the Cuvier Abyssal Plain to the Cape Range Peninsula and are important for their role in sustaining the nutrient conditions that support the high diversity of Ningaloo Reef. |
| **Natural Values** |
| The Marine Park includes examples of ecosystems representative of:<br>• Central Western Shelf Transition—continental shelf with water depths up to 100 m, and a significant transition zone between tropical and temperate species<br>• Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species<br>• Northwest Province—an area of continental slope comprising diverse and endemic fish communities.<br>Key ecological features of the Marine Park are:<br>• Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula—an area resulting in upwelling of nutrient rich water and aggregations of marine life<br>• Commonwealth waters adjacent to Ningaloo Reef—an area where the Leeuwin and Ningaloo currents interact resulting in enhanced productivity and aggregations of marine life<br>• Continental Slope Demersal Fish Communities—an area of high diversity of demersal fish assemblages on the continental slope<br>• Exmouth Plateau—a regionally and nationally unique deep-sea plateau in tropical waters.<br>Ecosystems represented in the Marine Park are influenced by the interaction of the Leeuwin Current, Leeuwin Undercurrent and the Ningaloo Current. |

| |
|---|
| The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds, internesting habitat for marine turtles, a migratory pathway for humpback whales, and foraging habitat and migratory pathway for pygmy blue whales. |
| **Cultural Values** |
| Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Marine Park.<br>The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. |
| **Heritage Values** |
| *World heritage*<br>The Ningaloo Coast was listed as an area of outstanding universal value under the World Heritage Convention in 2011, meeting world heritage listing criteria vii and x. The Ningaloo Coast World Heritage Property is adjacent to the Marine Park. Refer to Section 1.5.1 for further details.<br>*Commonwealth heritage*<br>The Ningaloo Marine Area (Commonwealth waters) was established on the Commonwealth Heritage List in 2004, meeting the Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area is adjacent to the Marine Park.<br>*National heritage*<br>The Ningaloo Coast was established on the National Heritage List in 2010, meeting the national heritage listing criteria A, B, C, D, and F and is adjacent to the Marine Park. Refer to Section 1.5.2 for further details.<br>*Historic shipwrecks*<br>The Marine Park contains more than five known shipwrecks listed under the *Historic Shipwrecks Act 1976*. |
| **Social and Economic Values** |
| Commercial fishing, mining and recreation are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation. |

### 1.5.5.2 Ningaloo Australian Marine Park

The Ningaloo AMP is included in the North-West Marine Park Network Management Plan 2018 (DNP, 2018) which provides an overview of the significance and values of the AMP (**Table 1-3**).

**Table 1-3: Ningaloo AMP significance and values**

| **Overview** |
|---|
| The Ningaloo Marine Park stretches approximately 300 km along the west coast of the Cape Range Peninsula, and is adjacent to the Western Australian Ningaloo Marine Park and Gascoyne Marine Park. The Marine Park covers an area of 2435 km² and a water depth range of 30 m to more than 500 m.<br>The Marine Park was originally proclaimed under the *National Parks and Wildlife Conservation Act 1975* on 20 May 1987 as the Ningaloo Marine Park (Commonwealth Waters), and proclaimed under the EPBC Act on 14 December 2013 and renamed Ningaloo Marine Park on 9 October 2017. The Marine Park is assigned IUCN category |

IV and includes two zones assigned under this plan: National Park Zone (II) and Recreational Use Zone (IV).

**Statement of Significance**

The Ningaloo Marine Park is significant because it contains habitats, species and ecological communities associated with the Central Western Shelf Transition, Central Western Transition, Northwest Province, and Northwest Shelf Province. It includes three key ecological features:

- canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (valued for unique seafloor features with ecological properties of regional significance)
- Commonwealth waters adjacent to Ningaloo Reef (valued for high productivity and aggregations of marine life)
- continental slope demersal fish communities (valued for high levels of endemism and diversity).

The Marine Park provides connectivity between deeper offshore waters of the shelf break and coastal waters of the adjacent Western Australian Ningaloo Marine Park. It includes some of the most diverse continental slope habitats in Australia, in particular the continental slope area between North West Cape and the Montebello Trough. Canyons in the Marine Park are important for their role in sustaining the nutrient conditions that support the high diversity of Ningaloo Reef.

The Marine Park is located in a transition zone between tropical and temperate waters and sustains tropical and temperate plants and animals, with many species at the limits of their distributions.

| **Natural Values** |
|---|
| The Marine Park includes examples of ecosystems representative of:<br>• Central Western Shelf Transition—continental shelf of water depths up to 100 m, and a significant transition zone between tropical and temperate species<br>• Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling and benthic slope communities comprising tropical and temperate species<br>• Northwest Province—an area of continental slope comprising diverse and endemic fish communities<br>• Northwest Shelf Province—a dynamic environment, influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales.<br>Key ecological features of the Marine Park are:<br>• Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula—an area resulting in upwelling of nutrient rich water and aggregations of marine life<br>• Commonwealth waters adjacent to Ningaloo Reef—an area where the Leeuwin and Ningaloo currents interact, resulting in enhanced productivity and aggregations of marine life Continental slope demersal fish communities—an area of high diversity among demersal fish assemblages on the continental slope.<br>Ecosystems represented in the Marine Park are influenced by interaction of the Leeuwin Current, Leeuwin Undercurrent and the Ningaloo Current.<br>The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and or foraging habitat for seabirds, internesting habitat for marine turtles, a migratory pathway for humpback whales, foraging habitat and migratory pathway for pygmy blue whales, breeding, calving, foraging and nursing habitat for dugong and foraging habitat for whale sharks. |
| **Cultural Values** |
| Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Marine Park.<br>The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. |
| **Heritage Values** |
| *World heritage*<br>The Marine Park is within the Ningaloo Coast World Heritage Property, recognised for its outstanding universal heritage values, meeting world heritage listing criteria vii and x. In addition to the Marine Park, the world heritage area includes the Western Australian Ningaloo Marine Park, the Murion Islands, the Western Australian Cape Range National Park and other terrestrial areas. The area is valued for high terrestrial species endemism, marine species diversity and abundance, and the interconnectedness of large-scale marine, coastal and terrestrial environments. The area connects the limestone karst system and fossil reefs of the ancient Cape Range to the nearshore reef system of Ningaloo Reef, to the continental slope and shelf in Commonwealth waters. Refer to Section 1.5.1 for further details.<br>*National heritage*<br>The Ningaloo Coast overlaps the Marine Park and was established on the National Heritage List in 2010, meeting the national heritage listing criteria A, B, C, D, and F. Refer to Section 1.5.2 for further details. |

| |
|---|
| *Commonwealth heritage*<br>The Ningaloo Marine Area (Commonwealth waters) was established on the Commonwealth Heritage List in 2004, meeting Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area overlaps the Marine Park.<br>*Historic shipwrecks*<br>The Marine Park contains more than 15 known shipwrecks listed under the *Historic Shipwrecks Act 1976*. |
| **Social and Economic Values** |
| Tourism and recreation, including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation. |

### 1.5.5.3 Montebello Australian Marine Park

The Montebello AMP is included in the North-West Marine Park Network Management Plan 2018 (DNP, 2018) which provides an overview of the significance and values of the AMP (Table 1-4).

**Table 1-4: Montebello AMP significance and values**

| **Overview** |
|---|
| The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the Western Australian state water boundary, and is adjacent to the Western Australian Barrow Island and Montebello Islands Marine Parks. The Marine Park covers an area of 3413 km² and water depths from less than 15 m to 150 m.<br>The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Montebello Marine Park on 9 October 2017. The Marine Park is assigned IUCN category VI and includes one zone assigned under this plan. |
| **Statement of Significance** |
| The Montebello Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province. It includes one key ecological feature:<br>• the ancient coastline at the 125 m depth contour (valued as a unique seafloor feature with ecological properties of regional significance).<br>The Marine Park provides connectivity between deeper waters of the shelf and slope, and the adjacent Barrow Island and Montebello Islands Marine Parks. A prominent seafloor feature in the Marine Park is Trial Rocks consisting of two close coral reefs. The reefs are emergent at low tide. |
| **Natural Values** |
| The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. A key ecological feature of the Marine Park is the ancient coastline at the 125 m depth contour where rocky escarpments are thought to provide biologically important habitat in areas otherwise dominated by soft sediments.<br>The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds, internesting, foraging, mating, and nesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for whale sharks. |

| Cultural Values |
|---|
| Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. At the commencement of this plan, there is limited information about the cultural significance of this Marine Park.<br>The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara region. |
| **Heritage Values** |
| No international, Commonwealth or national listings apply to the Marine Park at commencement of this plan, however the Marine Park is adjacent to the Western Australia Barrow Island and the Montebello–Barrow Island Marine Conservation Reserves which have been nominated for national heritage listing.<br>*Historic shipwrecks*<br>The Marine Park contains two known shipwrecks listed under the *Historic Shipwrecks Act 1976*: *Trial* (wrecked in 1622), the earliest known shipwreck in Australian waters and *Tanami* (unknown date). |
| **Social and Economic Values** |
| Tourism, commercial fishing, mining and recreation are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation. |

### 1.5.5.4 Shark Bay Australian Marine Park

The Shark Bay AMP is included in the North-West Marine Park Network Management Plan 2018 (DNP, 2018) which provides an overview of the significance and values of the AMP (Table 1-5Table 1-4).

**Table 1-5: Shark Bay AMP significance and values**

| Overview |
|---|
| The Shark Bay Marine Park is located approximately 60 km offshore of Carnarvon, adjacent to the Shark Bay world heritage property and national heritage place. The Marine Park covers an area of 7443 km², extending from the Western Australian state water boundary, and a water depth range between 15 m and 220 m.<br>The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Shark Bay Marine Park on 9 October 2017. The Marine Park is assigned IUCN category VI and includes one zone assigned under this plan: Multiple Use Zone (VI). |
| **Statement of Significance** |
| The Shark Bay Marine Park is significant because it contains habitats, species and ecological communities associated with the Central Western Shelf Province and Central Western Transition. The Marine Park provides connectivity between deeper Commonwealth waters and the inshore waters of the Shark Bay world heritage property. |
| **Natural Values** |
| The Marine Park includes examples of ecosystems representative of:<br>• Central Western Shelf—a predominantly flat, sandy and low-nutrient area, in water depths 50– 100 m. The bioregion is a transitional zone between tropical and temperate species; and<br>• Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and |

| |
|---|
| • benthic slope communities comprising tropical and temperate species .<br>Ecosystems represented in the Marine Park are influenced by the Leeuwin, Ningaloo and Capes currents.<br>The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds, internesting habitat for marine turtles, and a migratory pathway for humpback whales. The Marine Park and adjacent coastal areas are also important for shallow-water snapper. |
| **Cultural Values** |
| Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli and Malgana people have responsibilities for sea country in the Marine Park.<br>The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. |
| **Heritage Values** |
| No international, Commonwealth or national heritage listings apply to the Marine Park at commencement of this plan, but the Marine Park is adjacent to the Shark Bay, Western Australia World Heritage Property and Shark Bay, Western Australia National Heritage Place.<br>*Historic shipwrecks*<br>The Marine Park contains approximately 20 known shipwrecks listed under the Historic Shipwrecks Act 1976. |
| **Social and Economic Values** |
| Tourism, commercial fishing, mining and recreation, including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation. |

### 1.5.6 State Marine Protected Areas

No State-managed Marine Parks occur within the Operational Area. Two suites of conservation areas occur within the ZPI; the Ningaloo Marine Park and Muiron Islands Marine Management Area, and the Barrow Island Marine Park/Marine Management Area and Montebello Marine Park.

#### 1.5.6.1 Ningaloo Marine Park and Muiron Islands Marine Management Area

The Ningaloo Marine Park was established in 1987 and stretches 300 km from the North West Cape to Red Bluff. It encompasses the State waters covering the Ningaloo Reef system and a 40 m strip along the upper shore. The Muiron Islands Marine Management Area is managed under the same management plan as the Ningaloo State Marine Park (CALM, 2005). The Ningaloo Marine Park and Muiron Islands Marine Management Area are part of the Ningaloo Coast WHA (Section 1.5). They are located 72 kilometres south-west from the Operational Area.

Ecological and conservation values of the Ningaloo Marine Park and Muiron Islands are summarised below. Generally, all ecological values are presumed to be in an undisturbed condition except for some localised high use areas (CALM, 2005). The ecological and conservation values include:

- unique geomorphology resulting in high habitat and species diversity

- high sediment and water quality
- subtidal and intertidal coral reef communities providing resources for marine flora and fauna
- filter feeding communities (sponge gardens) in the northern part of the North West Cape and the Muiron and Sunday Islands
- shoreline intertidal reef communities providing feeding habitat for larger fish and other marine animals
- soft sediment communities found in deeper waters providing a rich food source food for invertebrates
- macroalgae and seagrass communities
- mangrove communities occur only in the northern part of the Ningaloo Marine Park
- diverse fish fauna (approximately 460 species)
- internesting, nesting and hatchling habitat for several species of marine turtles including the loggerhead, green, flatback and hawksbill turtles
- foraging aggregations of whale sharks between March to July
- seasonal shark aggregations and manta rays
- annual mass coral spawning on Ningaloo Reef
- marine mammals such as dugong and small cetacean populations frequenting or residing in nearshore waters, although these occur outside the area overlapped by the ZPI
- nesting and foraging habitat for seabirds and shorebirds.

The Ningaloo Marine Park and Muiron Islands Marine Management Area Management Plan 2005-2015 (CALM, 2005) outlines objectives for each value identified for this area and any potential or existing threats which could impact these values. These are discussed in Table 1-6. Considering the Operational Area does not overlap the Ningaloo Marine Park and Muiron Islands Marine Management Area, potential impacts would only relate to potential hydrocarbon spills reaching these areas and activities associated with any hydrocarbon spill response.

**Table 1-6: Values, associated management objectives and relevant key threats from the Ningaloo Marine Park and Muiron Islands Marine Management Area Management Plan 2005-2015**

| Value | Associated management objectives | Relevant existing and potential threats identified in Management Plan | Relevant EP section |
|---|---|---|---|
| **Ecological values** | | | |
| Geomorphology | To ensure commercial and recreational access and use do not degrade coastal landforms within the reserves. | Not relevant | Not relevant |

| Value | Associated management objectives | Relevant existing and potential threats identified in Management Plan | Relevant EP section |
|---|---|---|---|
| Sediment quality | To ensure that the sediment quality of the reserves is maintained at a level which supports and maintains the area's ecological and social values. | Not relevant | Not relevant |
| Water quality | To ensure the water quality of the reserves is maintained at a level which supports and maintains the areas ecological and social values. | No explicit threats from hydrocarbon spill, i.e.:<br>• toxicant inputs from the accidental spillage of fuel and oils, or<br>• hydrocarbon spills from passing ships | Hydrocarbon spill risks and impacts are considered in Section 8 of the EP |
| Coral reef communities | To ensure the diversity and abundance of coral reef communities in the reserves are not significantly impacted by human activities within the reserves. | Pollution events (shipping, oil/gas industry) | |
| Filter feeding communities (other than coral reefs) | To ensure that important filter feeding communities are not significantly impacted by human activities in the reserves. | Not relevant | Not relevant |
| Shoreline and intertidal communities | To ensure the diversity and abundance of shoreline intertidal reef communities in the reserves are not significantly impacted by trampling and recreational collecting within the reserves. | Pollution events (shipping, oil/gas industry) | Hydrocarbon spill risks and impacts are considered in Section 8 of the EP. |
| Soft sediment communities | To ensure the species diversity and biomass of soft sediment communities within the reserves are not significantly impacted by human activities in the Park. | Not relevant | Not relevant |
| Macroalgal and seagrass communities | To ensure seagrass and macro-algal communities are not disturbed as a result of human activities in the reserves. | Pollution events (shipping, oil/gas industry) | Hydrocarbon spill risks and impacts are considered in Section 8 of the EP |
| Mangrove communities | To ensure the species diversity and abundance of mangrove communities within the Park are not significantly impacted by trampling. | Pollution events (shipping, oil/gas industry) | |
| Coastal biological communities | To ensure that the species diversity and abundance of coastal biological communities within the Park are not significantly impacted by physical disturbances associated with grazing, trampling and 4WD access. | Not relevant | Not relevant |

| Value | Associated management objectives | Relevant existing and potential threats identified in Management Plan | Relevant EP section |
|---|---|---|---|
| Seabirds, shorebirds and migratory waders | To ensure the species diversity and abundance of seabird, shorebird and migratory bird species in the reserves are not significantly impacted by human activity. | Pollution events (shipping, oil/gas industry) | Hydrocarbon spill risks and impacts are considered in Section 8 of the EP |
| Finfish | To ensure the species distribution and abundance of finfish species are not unacceptably impacted by recreational and commercial fishing in the reserves. | Not relevant | Not relevant |
| Invertebrates | To gain an understanding of the invertebrate diversity and abundance throughout the reserves to facilitate long-term management. | Not relevant | Not relevant |
| Sharks and rays | To ensure that shark diversity and abundance are not significantly impacted by recreational and commercial fishing activities in the reserves. | Not relevant | Not relevant |
| Whale sharks | To ensure whale sharks migrating through the reserves are not disturbed by boating and interaction activities. | Not relevant | Not relevant |
| Manta rays | To ensure that manta rays in the reserves are not significantly disturbed by interactive tours or recreational boat users or snorkelers. | Not relevant | Not relevant |
| Whales and dolphins | To ensure whales and dolphins in the reserves are not significantly disturbed by commercial whale interaction tours. | Not relevant | Not relevant |
| Turtles | To ensure turtles in the reserves are not significantly disturbed by foxes or recreational activities on beaches (i.e. vehicles, walkers). | Not relevant | Not relevant |
| Dugong | To ensure dugong in the reserves are not significantly disturbed by human activity. | Not relevant | Not relevant |
| **Social values** | | | |
| No specific threats/management objectives identified for the Petroleum Activities Program. | | | |

### 1.5.6.2 Barrow Island Marine Management Area, Barrow Island Marine Park and

**Montebello Islands Marine Park**

The Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves 2007-2017 (DEC 2007) directs management for three reserves, the Montebello Islands Marine Park, Barrow Island Marine Park and Barrow Island Marine Management Area. The reserves are located, approximately 26 km east from the PAA within the ZPI, and cover areas of approximately 58,331 ha, 4,169 ha and 114,693 ha respectively.

The Montebello/Barrow islands marine conservation reserves have very complex seabed and island topography including sheltered lagoons, channels, beaches and cliffs. This complexity has resulted in a myriad of different habitats in the reserves supported by high sediment and water quality. These habitats include subtidal coral reefs, macroalgal and seagrass communities, subtidal soft-bottom communities, rocky shores and intertidal reef platforms, which support a rich diversity of invertebrates and finfish. The mangrove communities are made of up six species and are considered to be globally significant because they occur in lagoons of offshore islands. The reserves are important breeding areas for several species of marine turtles and seabirds, which use the undisturbed sandy beaches for nesting. Humpback whales migrate through the reserves and dugongs occur in the shallow warm waters (DEC, 2007).

The specific ecological and social values of the reserves are listed below (DEC, 2007).

**Summary of Ecological Values**

- **Geomorphology:** A complex seabed and island topography consisting of subtidal and intertidal reefs, sheltered lagoons, channels, beaches and cliffs.
- **Sediment quality:** The sediments of the reserves are generally pristine, which is essential to the maintenance of healthy marine ecosystems.
- **Water quality:** The waters of the reserves are generally pristine, which is essential to the maintenance of healthy marine ecosystems.
- **Coral reef communities:** Undisturbed intertidal and subtidal coral reefs and bommies with a high diversity of hard corals.
- **Mangrove communities:** Six species of mangroves are found in the reserves, with the Montebello Islands' mangrove communities considered globally unique as they occur in lagoons of offshore islands.
- **Macroalgal and seagrass communities:** Extensive subtidal macroalgal and seagrass communities are important primary producers and refuge areas for fishes and invertebrates.
- **Rocky shore/intertidal reef platform communities:** Rocky shores predominate on most of the islands of the reserves and provide habitat for a variety of intertidal organisms, which in turn provide food for shorebirds.
- **Intertidal sand/mudflat communities:** The intertidal sand/mudflat communities are primary producers with an abundant invertebrate fauna, which provides a valuable food source for shorebirds.
- **Subtidal soft-bottom communities:** Subtidal sand and silt habitats support a variety of fauna including burrowing invertebrates and filter-feeding communities.

- **Marine mammals:** Ten species of cetaceans are recorded from the reserves, with the humpback whale passing through the area during its annual migration. Dugongs are found in the shallow warm waters.
- **Turtles:** Green, flatback, hawksbill, loggerhead and leatherback turtles are found in the reserves, with the Western Australian hawksbill population being the largest remaining in the Indian Ocean. Four species use sandy beaches in the reserves for nesting.
- **Seabirds:** The reserves provide important feeding and resting areas for migrating shorebirds. Islands within the reserves are nesting areas for 15 species of seabirds.
- **Finfishes:** A rich finfish fauna with at least 456 species.
- **Invertebrates:** A diverse marine invertebrate fauna comprising mostly tropical species.

**Summary of Social Values**

- **Hydrocarbon exploration and production industry:** The Montebello/Barrow islands region is within the State's most productive petroleum area (for both oil and gas).
- **Pearling:** The warm pristine waters of the reserves provide optimal conditions for production of high quality pearls by the existing pearling operations.
- **Nature-based tourism:** The reserves are developing rapidly as an important area for the nature-based tourism industry, with charter boats taking tourists to the Montebello Islands to participate in activities such as fishing, diving, wildlife viewing, island exploring and surfing.
- **Commercial fishing:** The reserves are used by commercial fishers targeting a variety of finfish, sharks and beche de mer.
- **Recreational fishing**: Excellent shore and boat-based recreational fishing opportunities targeting a variety of pelagic and reef finfish species, mud crabs and other edible invertebrates.
- **Water sports:** The natural values, climate, and scenic values provide the basis for a wide range of recreational activities.
- **European history/maritime heritage:** The Montebello Islands have a history of European contact dating from 1622, which includes pearling, whaling, fishing for turtles and, more recently, British atomic testing.
- **Scientific research:** The undisturbed nature and wide variety habitats and communities within the reserves provide unique opportunities for scientific research.

The Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves 2007-2017 (DEC 2007) outlines objectives for each value identified for these areas and any potential or existing threats which could impact these values. These are discussed in Table 1-7. Considering the Operational Area does not overlap these areas, potential impacts would only relate to potential hydrocarbon spills reaching these and activities associated with any hydrocarbon spill response.

**Table 1-7: Values, associated management objectives and relevant key threats from the Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves 2007-2017**

| Value | Associated management objectives | Relevant existing and potential threats identified in Management Plan | Relevant EP section |
|---|---|---|---|
| **Ecological values** | | | |
| Geomorphology | 1. To ensure the structural complexity of the reserves' geomorphology is not significantly reduced by installation of pipelines, or infrastructure development.<br>2. To ensure coastal landforms within the reserves are not significantly degraded by installation of pipelines, or infrastructure development. | Not relevant | Not relevant |
| Sediment quality | To facilitate long-term management by accumulating spatial and temporal information about impacts on sediment quality from various activities in the reserves. | Not relevant | Not relevant |
| Water quality | To facilitate long-term management by accumulating spatial and temporal information on impacts on water quality of various activities in the reserves. | Discharge of toxicants and physical and chemical stressors from accidental spillage of petroleum products. | Hydrocarbon spill risks and impacts are considered in Section 8 of the EP |
| Coral reef communities | To ensure coral reef communities are not significantly impacted by accidental spillage of petroleum products or physical disturbance from development activities. | Accidental spillage of petroleum products. | |
| Macroalgal and seagrass communities | To gain an increased understanding of the macroalgal and seagrass communities in the reserves to facilitate long-term management. | Discharge of toxicants and other physical and chemical stressors from accidental spillage of petroleum products | Hydrocarbon spill risks and impacts are considered in Section 8 of the EP |
| Mangrove communities | To ensure that mangrove communities are not significantly impacted by physical disturbance or mud crabbing in the reserves. | Not relevant | Not relevant |

| Value | Associated management objectives | Relevant existing and potential threats identified in Management Plan | Relevant EP section |
|---|---|---|---|
| Rocky shore/intertidal reef platform communities | To gain an increased understanding of the rocky shore/intertidal reef platform communities in the reserves to facilitate long-term management. | Accidental spillage of petroleum products | Hydrocarbon spill risks and impacts are considered in Section 8 of the EP |
| Intertidal sand/mudflat communities | To ensure that intertidal sand/mudflat communities are not significantly impacted by development activities in the reserves. | Discharge of toxicants and other physical and chemical stressors from accidental spillage of petroleum products | |
| Subtidal soft-bottom communities | To ensure that subtidal soft-bottom communities are not significantly impacted by physical disturbance in the reserves. | Discharge of toxicants and other physical and chemical stressors from accidental spillage of petroleum products | |
| Marine mammals | To gain an increased understanding of marine mammals in the reserves to facilitate long-term management. | Accidental spillage of petroleum products | |
| Turtles | To ensure no loss of species diversity and abundance of turtles in the reserves, particularly in relation to the potential impacts of lights and flares on hatchlings. | Accidental spillage of petroleum products. | |
| Seabirds | To gain an increased understanding of the seabirds of the reserves to facilitate long-term management. | Accidental spillage of petroleum products | |
| Finfish | To gain an increased understanding of the finfish diversity and abundance throughout the reserves to facilitate long-term management. | Accidental spillage of petroleum products | |
| Invertebrates | To gain an increased understanding of the invertebrate diversity and abundance throughout the reserves to facilitate long-term management. | Accidental spillage of petroleum products | |
| **Social values** | | | |
| No specific threats/management objectives identified for the Petroleum Activities Program. | | | |

### 1.5.7 Key Ecological Features

An EPBC Protected Matters Search shows that the Operational Area contains one Key Ecological Feature (KEF) with an additional three within the ZPI which have been identified in the North-West Marine Bioregional Plan (Commonwealth of Australia, 2012). Under section 176 of the EPBC Act, once a bioregional plan has been made the minister responsible for the environment must have regard to it when making any decision under the Act to which the plan is relevant (DoEE, 2019).

The KEFs identified are:

- Ancient Coastline at 125 m depth contour (within Operational Area)
- Continental Slope demersal fish communities (within ZPI, 15 km to west of Operational Area)
- Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (within ZPI, 45 km to south west of Operational Area)
- Commonwealth waters adjacent to Ningaloo Reef (within ZPI, 110 km to south west of Operational Area).
- Exmouth Plateau (within ZPI, 90 km west of Operational Area).

#### 1.5.7.1 Ancient Coastline at 125 m Depth Contour

The ancient coastline presents a unique portion of the seafloor with ecological features of regional importance (Commonwealth of Australia, 2012). The shelf of the Northwest Marine Region contains several terraces and steps which reflect the gradual increase in sea level across the shelf that occurred during the Holocene (Commonwealth of Australia, 2012). The most prominent of these occurs episodically as an escarpment through the North West Shelf (NWS) and Northwest Transition, at a depth of approximately 125 m. It has been suggested that humpback whales, whale sharks and other migratory pelagic species may use this escarpment as a guide as they move through the region (Commonwealth of Australia, 2012). Fauna associated with the hard substrate of the escarpment is likely to include sponges, corals, crinoids, molluscs, echinoderms and other benthic invertebrates representative of hard substrate fauna in the North West Shelf bioregion (Commonwealth of Australia, 2012). Although the ancient coastline adds additional habitat types to a representative system, the habitat types would not be unique to the coastline as they are widespread on the upper shelf (Falkner *et al.*, 2009).

This KEF crosses the north-western corner of the Operational Area which is away from any subsea infrastructure.

#### 1.5.7.2 Continental Slope Demersal Fish Communities

The demersal fish assemblages on the continental slope in the Timor Province, the Northwest Transition and the Northwest Province are highly diverse and contain a number of endemic species (Commonwealth of Australia, 2012). The continental slope between North West Cape and the Montebello Trough has more than 500 fish species, 76 of which are endemic, which makes it the most diverse slope bioregion in Australia (Last *et al.*, 2005). The slope of the Timor Province and the Northwest Transition is also

home to over 500 species of demersal fish, of which 64 are believed to be endemic (Last *et al.*, 2005). The Timor Province and Northwest Transition bioregions are the second-richest areas for demersal fish across the entire continental slope. The region is valued for its high levels of endemism (Commonwealth of Australia, 2012).

#### 1.5.7.3 Canyons Linking the Cuvier Abyssal Plain and the Cape Range Peninsula

The canyons on the Cuvier Abyssal Plain and Cape Range Peninsula slope connect to the Commonwealth waters near Ningaloo Reef. The Leeuwin Current produces eddies inside the heads of the canyons, drawing waters from the Antarctic intermediate water mass into shallower depths and onto the shelf (Brewer *et al.*, 2007). Strong internal tides may also aid upwelling at the canyon heads (Brewer *et al.*, 2007). These waters are cool and nutrient-rich, and the narrow shelf width near the canyons facilitates nutrient upwelling, which interacts with the Leeuwin Current at the canyon heads. Aggregations of whale sharks, humpback whales, manta rays, sharks, sea snakes, large predatory fish and seabirds are known to occur within the area, linked to enhanced productivity (Sleeman *et al.*, 2007).

#### 1.5.7.4 Commonwealth Waters Adjacent to Ningaloo Reef

Ningaloo Reef extends more than 260 km along Cape Range Peninsula with a landward lagoon 200 m to 6 km wide. The reef drops gently to depths of 8-10 m seaward of the reef crest, with waters reaching 100 m depth 5-6 km beyond the edge of the reef. Commonwealth waters over the narrow shelf (10 km at its narrowest) and shelf break are contiguous with Ningaloo Reef and linked by oceanographic and trophic cycling (Brewer *et al.*, 2007; DEWHA, 2008).

The Commonwealth waters adjacent to Ningaloo Reef and associated plateau and canyons support high productivity and species richness. Interactions occur between the Leeuwin and Ningaloo currents on the seaward side of the reef, resulting in corridors of enhanced productivity which form migratory pathways and support aggregations of whale sharks, humpback whales, manta rays, sharks, sea snakes, large predatory fish and seabirds (Donovan *et al.*, 2008; Gunn *et al.*, 1999; Waples & Hollander, 2008).

Detrital input from phytoplankton production in surface waters and from higher-trophic consumers cycles back to the deeper shelf and slope waters (Brewer *et al.*, 2007). Deep water biodiversity includes fish, sponges, molluscs, soft corals and gorgonians, with some of these communities appearing to differ significantly than those at other locations along the Australian coastline, suggesting that the Commonwealth waters adjacent to Ningaloo Reef are uniquely biodiverse (Rees *et al.*, 2004).

The KEF includes the Ningaloo Australian Marine Park and further information can be found in Section 1.5.5.

#### 1.5.7.5 Exmouth Plateau

The Exmouth Plateau is defined as a KEF as it is a unique seafloor feature with ecological properties of regional significance. The Exmouth Plateau covers an area of 49,310 km$^2$ and is located approximately 150 km northwest of Exmouth. The plateau ranges in water depths from 800 to 4,000 m (Heap & Harris 2008 in DSEWPaC 2012). The plateau's surface is rough and undulating at 800–1,000 m depth. The northern margin is steep

and intersected by large canyons (e.g. Montebello and Swan canyons) with relief greater than 50 m. The western margin is moderately steep and smooth and the southern margin is gently sloping and virtually free of canyons (Falkner et al. 2009 in DSEWPaC 2012).

The Exmouth Plateau may serve an important ecological role by acting as a topographic obstacle that modifies the flow of deep waters that generate internal tides, causing upwelling of deeper water nutrients closer to the surface (Brewer et al. 2007). Sediments on the plateau suggest that biological communities include scavengers, benthic filter feeders and epifauna. Whaling records from the 19th century suggest that the Exmouth Plateau may have supported large populations of sperm whales (Bannister et al. 2007). Fauna in the pelagic waters above the plateau are likely to include small pelagic species and nekton (Brewer et al. 2007).

## 1.6 Protected Matters Search Tool Results

Australian Government

Department of Agriculture, Water and the Environment

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

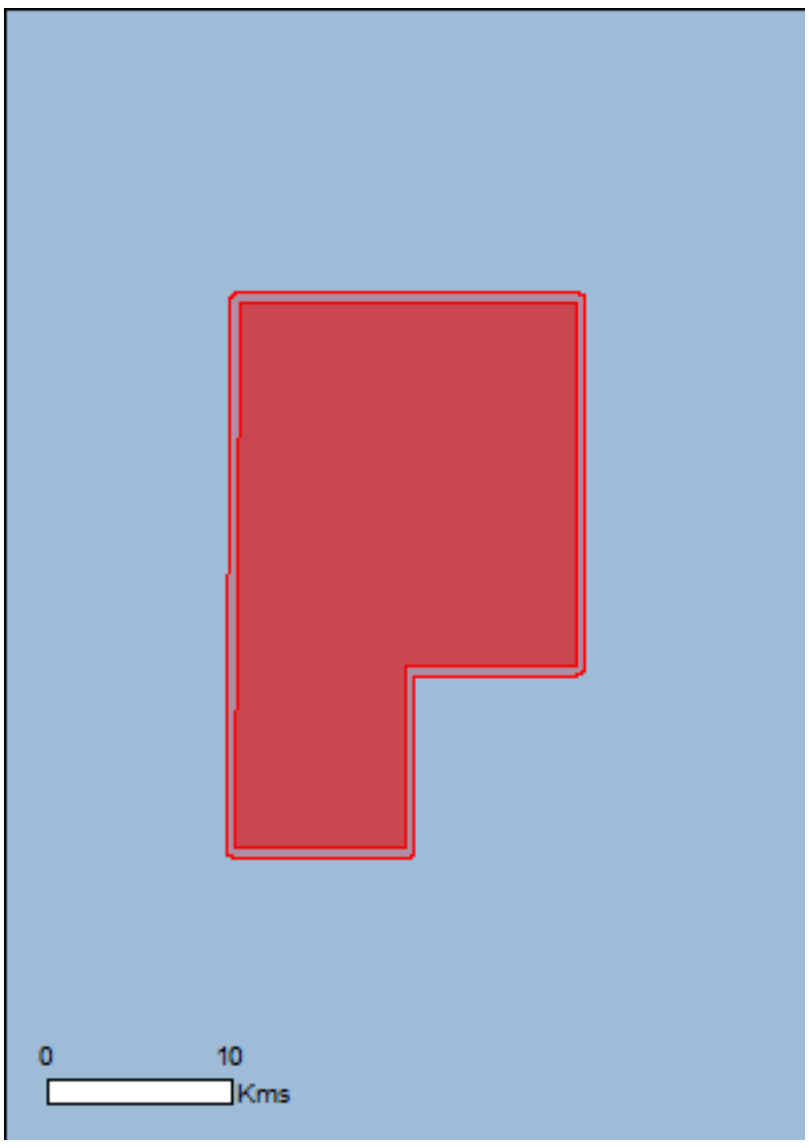
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 03/03/21 10:08:51


Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

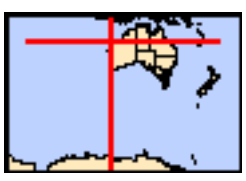
Caveat
Acknowledgements




Coordinates

Buffer: 0.5Km



# 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: | 20 |
| Listed Migratory Species: | 35 |

## 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: | 59 |
| Whales and Other Cetaceans: | 27 |
| 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<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Sternula nereis  nereis<br>Australian Fairy Tern [82950] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Mammals | | |
| Balaenoptera borealis<br>Sei Whale [34] | Vulnerable | Species or species habitat likely to occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |
| Balaenoptera physalus<br>Fin Whale [37] | Vulnerable | Species or species habitat likely to occur within area |
| Eubalaena australis<br>Southern Right Whale [40] | Endangered | Species or species |

| Name | Status | Type of Presence |
|---|---|---|
| | | habitat may 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 known to occur within area |
| Chelonia mydas | | |
| Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| Dermochelys coriacea | | |
| Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat likely to occur within area |
| Eretmochelys imbricata | | |
| Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Natator depressus | | |
| Flatback Turtle [59257] | Vulnerable | Congregation or aggregation known to occur within area |
| Sharks | | |
| Carcharias taurus (west coast population) | | |
| Grey Nurse Shark (west coast population) [68752] | Vulnerable | Species or species habitat may occur within area |
| Carcharodon carcharias | | |
| White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat may occur within area |
| 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 may occur within area |
| Calonectris leucomelas | | |
| Streaked Shearwater [1077] | | Species or species habitat likely to occur within area |
| Fregata ariel | | |
| Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat likely to occur within area |
| Macronectes giganteus | | |
| Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Migratory Marine Species | | |
| Anoxypristis cuspidata | | |
| Narrow Sawfish, Knifetooth Sawfish [68448] | | Species or species |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | habitat may occur within area |
| Balaena glacialis  australis<br>Southern Right Whale [75529] | Endangered* | Species or species habitat may occur within area |
| Balaenoptera borealis<br>Sei Whale [34] | Vulnerable | Species or species habitat likely to occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |
| Balaenoptera physalus<br>Fin Whale [37] | Vulnerable | Species or species habitat likely to occur within area |
| Carcharhinus longimanus<br>Oceanic Whitetip Shark [84108] | | Species or species habitat likely to occur within area |
| Carcharodon carcharias<br>White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat may occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat likely to occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Isurus oxyrinchus<br>Shortfin Mako, Mako Shark [79073] | | Species or species habitat likely to occur within area |
| Isurus paucus<br>Longfin Mako [82947] | | Species or species habitat likely to occur within area |
| Manta alfredi<br>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<br>Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995] | | Species or species habitat likely to occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | Vulnerable | Species or species habitat known to occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Congregation or aggregation known to occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | 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 |
| Tursiops aduncus (Arafura/Timor Sea populations) | | |
| Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900] | | Species or species habitat known to occur within area |
| Migratory Wetlands Species | | |
| Actitis hypoleucos | | |
| Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Calidris acuminata | | |
| Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris canutus | | |
| Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus | | |
| Osprey [952] | | 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 |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat likely to occur within area |
| Fregata ariel<br>Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat likely to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat may occur within area |
| Fish | | |
| Acentronura larsonae<br>Helen's Pygmy Pipehorse [66186] | | Species or species habitat may occur within area |
| Bulbonaricus brauni<br>Braun's Pughead Pipefish, Pug-headed Pipefish [66189] | | Species or species habitat may occur within area |
| Campichthys tricarinatus<br>Three-keel Pipefish [66192] | | Species or species habitat may occur within area |
| Choeroichthys brachysoma<br>Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194] | | Species or species habitat may occur within area |
| Choeroichthys latispinosus<br>Muiron Island Pipefish [66196] | | Species or species habitat may occur within area |
| Choeroichthys suillus<br>Pig-snouted Pipefish [66198] | | Species or species habitat may occur within area |
| Doryrhamphus dactyliophorus<br>Banded Pipefish, Ringed Pipefish [66210] | | Species or species habitat may occur within area |
| Doryrhamphus janssi<br>Cleaner Pipefish, Janss' Pipefish [66212] | | Species or species habitat may occur within area |
| Doryrhamphus multiannulatus<br>Many-banded Pipefish [66717] | | Species or species habitat may occur within area |
| Doryrhamphus negrosensis<br>Flagtail Pipefish, Masthead Island Pipefish [66213] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Festucalex scalaris<br>Ladder Pipefish [66216] | | Species or species habitat may occur within area |
| Filicampus tigris<br>Tiger Pipefish [66217] | | Species or species habitat may occur within area |
| Halicampus brocki<br>Brock's Pipefish [66219] | | Species or species habitat may occur within area |
| Halicampus grayi<br>Mud Pipefish, Gray's Pipefish [66221] | | Species or species habitat may occur within area |
| Halicampus nitidus<br>Glittering Pipefish [66224] | | Species or species habitat may occur within area |
| Halicampus spinirostris<br>Spiny-snout Pipefish [66225] | | Species or species habitat may occur within area |
| Haliichthys taeniophorus<br>Ribboned Pipehorse, Ribboned Seadragon [66226] | | Species or species habitat may occur within area |
| Hippichthys penicillus<br>Beady Pipefish, Steep-nosed Pipefish [66231] | | Species or species habitat may occur within area |
| Hippocampus angustus<br>Western Spiny Seahorse, Narrow-bellied Seahorse [66234] | | Species or species habitat may occur within area |
| Hippocampus histrix<br>Spiny Seahorse, Thorny Seahorse [66236] | | Species or species habitat may occur within area |
| Hippocampus kuda<br>Spotted Seahorse, Yellow Seahorse [66237] | | Species or species habitat may occur within area |
| Hippocampus planifrons<br>Flat-face Seahorse [66238] | | Species or species habitat may occur within area |
| Hippocampus trimaculatus<br>Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720] | | Species or species habitat may occur within area |
| Micrognathus micronotopterus<br>Tidepool Pipefish [66255] | | Species or species habitat may occur within area |
| Phoxocampus belcheri<br>Black Rock  Pipefish [66719] | | Species or species habitat may occur within area |
| Solegnathus hardwickii<br>Pallid Pipehorse, Hardwick's Pipehorse [66272] | | Species or species habitat may occur within area |
| Solegnathus lettiensis<br>Gunther's Pipehorse, Indonesian Pipefish [66273] | | Species or species habitat may occur within area |
| Solenostomus cyanopterus<br>Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Syngnathoides biaculeatus<br>Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279] | | Species or species habitat may occur within area |
| Trachyrhamphus bicoarctatus<br>Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280] | | Species or species habitat may occur within area |
| Trachyrhamphus longirostris<br>Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281] | | Species or species habitat may occur within area |
| **Reptiles** | | |
| Acalyptophis peronii<br>Horned Seasnake [1114] | | Species or species habitat may occur within area |
| Aipysurus duboisii<br>Dubois' Seasnake [1116] | | Species or species habitat may occur within area |
| Aipysurus eydouxii<br>Spine-tailed Seasnake [1117] | | Species or species habitat may occur within area |
| Aipysurus laevis<br>Olive Seasnake [1120] | | Species or species habitat may occur within area |
| Astrotia stokesii<br>Stokes' Seasnake [1122] | | Species or species habitat may occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat likely to occur within area |
| Disteira kingii<br>Spectacled Seasnake [1123] | | Species or species habitat may occur within area |
| Disteira major<br>Olive-headed Seasnake [1124] | | Species or species habitat may occur within area |
| Ephalophis greyi<br>North-western Mangrove Seasnake [1127] | | Species or species habitat may occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Hydrophis czeblukovi<br>Fine-spined Seasnake [59233] | | Species or species habitat may occur within area |
| Hydrophis elegans<br>Elegant Seasnake [1104] | | Species or species habitat may occur within area |
| Hydrophis ornatus<br>Spotted Seasnake, Ornate Reef Seasnake [1111] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Congregation or aggregation known to occur within area |
| Pelamis platurus<br>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<br>Minke Whale [33] | | Species or species habitat may occur within area |
| Balaenoptera borealis<br>Sei Whale [34] | Vulnerable | Species or species habitat likely to occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |
| Balaenoptera physalus<br>Fin Whale [37] | Vulnerable | Species or species habitat likely to occur within area |
| Delphinus delphis<br>Common Dophin, Short-beaked Common Dolphin [60] | | Species or species habitat may occur within area |
| Eubalaena australis<br>Southern Right Whale [40] | Endangered | Species or species habitat may occur within area |
| Feresa attenuata<br>Pygmy Killer Whale [61] | | Species or species habitat may occur within area |
| Globicephala macrorhynchus<br>Short-finned Pilot Whale [62] | | Species or species habitat may occur within area |
| Grampus griseus<br>Risso's Dolphin, Grampus [64] | | Species or species habitat may occur within area |
| Kogia breviceps<br>Pygmy Sperm Whale [57] | | Species or species habitat may occur within area |
| Kogia simus<br>Dwarf Sperm Whale [58] | | Species or species habitat may occur within area |
| Lagenodelphis hosei<br>Fraser's Dolphin, Sarawak Dolphin [41] | | Species or species habitat may occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | Vulnerable | Species or species habitat known to occur within area |
| Mesoplodon densirostris<br>Blainville's Beaked Whale, Dense-beaked Whale [74] | | Species or species habitat may occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat may occur within area |
| Peponocephala electra<br>Melon-headed Whale [47] | | Species or species habitat may occur within area |
| Physeter macrocephalus<br>Sperm Whale [59] | | Species or species habitat may occur within area |
| Pseudorca crassidens<br>False Killer Whale [48] | | Species or species habitat likely to occur within area |
| Stenella attenuata<br>Spotted Dolphin, Pantropical Spotted Dolphin [51] | | Species or species habitat may occur within area |
| Stenella coeruleoalba<br>Striped Dolphin, Euphrosyne Dolphin [52] | | Species or species habitat may occur within area |
| Stenella longirostris<br>Long-snouted Spinner Dolphin [29] | | Species or species habitat may occur within area |
| Steno bredanensis<br>Rough-toothed Dolphin [30] | | Species or species habitat may occur within area |
| Tursiops aduncus<br>Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418] | | Species or species habitat may occur within area |
| Tursiops aduncus (Arafura/Timor Sea populations)<br>Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900] | | Species or species habitat known to occur within area |
| Tursiops truncatus s. str.<br>Bottlenose Dolphin [68417] | | Species or species habitat may occur within area |
| Ziphius cavirostris<br>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

-20.83203 114.83646,-21.08204 114.83464,-21.08203 114.91797,-20.9987 114.91797,-20.9987 115.0013,-20.83203 115.0013,-20.83203 114.83646

# Acknowledgements

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

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

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

Please feel free to provide feedback via the Contact Us page.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# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

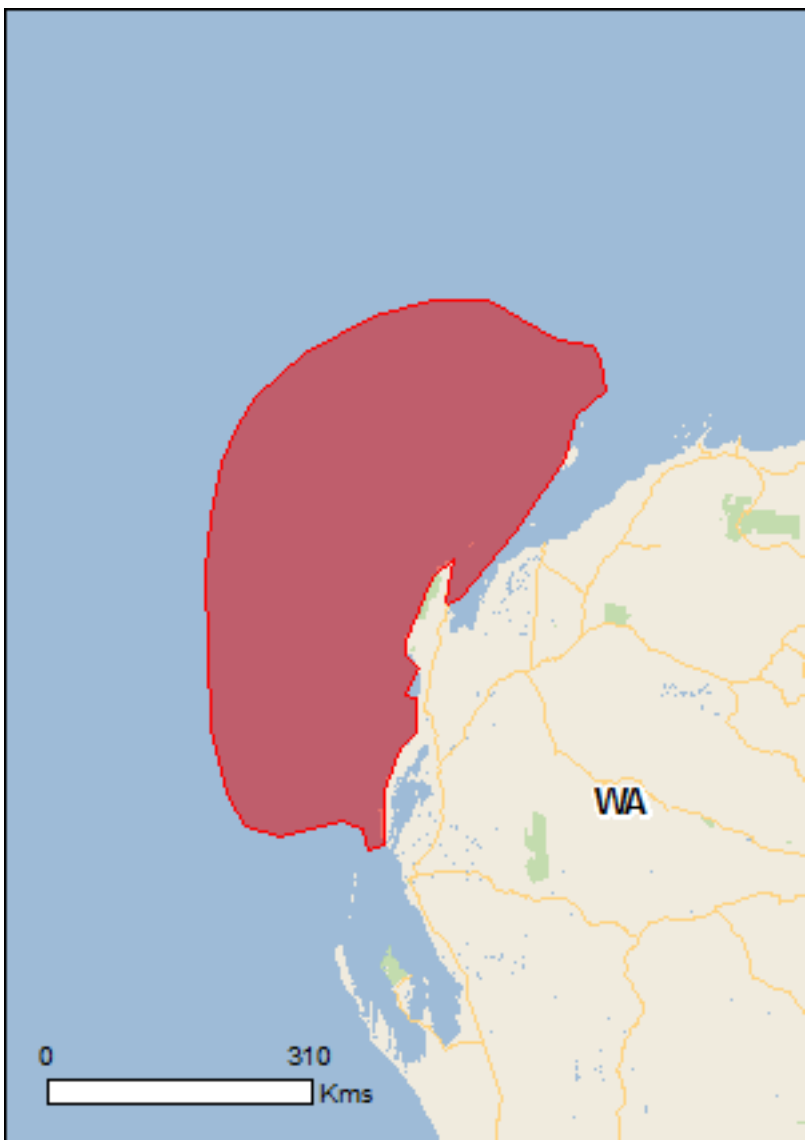
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 25/02/21 17:05:12


Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

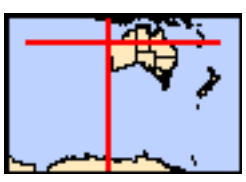
Caveat
Acknowledgements




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: | 41 |
| Listed Migratory Species: | 58 |

## 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: | 5 |
| Commonwealth Heritage Places: | 1 |
| Listed Marine Species: | 103 |
| Whales and Other Cetaceans: | 31 |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | 7 |

## Extra Information

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

| | |
|---|---|
| State and Territory Reserves: | 13 |
| Regional Forest Agreements: | None |
| Invasive Species: | 13 |
| Nationally Important Wetlands: | 1 |
| 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<br>Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Falco hypoleucos<br>Grey Falcon [929] | Vulnerable | Species or species habitat likely to occur within area |
| Limosa lapponica  menzbieri<br>Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432] | Critically Endangered | Species or species habitat known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Malurus leucopterus  edouardi<br>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<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| Pezoporus occidentalis<br>Night Parrot [59350] | Endangered | Species or species habitat may occur within area |
| Pterodroma mollis<br>Soft-plumaged Petrel [1036] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area |
| Sternula nereis  nereis<br>Australian Fairy Tern [82950] | Vulnerable | Breeding known to occur within area |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Species or species habitat may occur within area |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris<br>Black-browed Albatross [66472] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche steadi<br>White-capped Albatross [64462] | Vulnerable | Species or species habitat may occur within area |
| Fish | | |
| Milyeringa veritas<br>Blind Gudgeon [66676] | Vulnerable | Species or species habitat known to occur within area |
| Ophisternon candidum<br>Blind Cave Eel [66678] | Vulnerable | Species or species habitat known to occur within area |
| Mammals | | |
| Balaenoptera borealis<br>Sei Whale [34] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Migration route known to occur within area |
| Balaenoptera physalus<br>Fin Whale [37] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Bettongia lesueur  Barrow and Boodie Islands subspecies<br>Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021] | Vulnerable | Species or species habitat likely to occur within area |
| Dasyurus hallucatus<br>Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331] | Endangered | Species or species habitat likely to occur within area |
| Eubalaena australis<br>Southern Right Whale [40] | Endangered | Species or species habitat likely to occur within area |
| Isoodon auratus  barrowensis<br>Golden Bandicoot (Barrow Island) [66666] | Vulnerable | Species or species habitat known to occur within area |
| Lagorchestes conspicillatus  conspicillatus<br>Spectacled Hare-wallaby (Barrow Island) [66661] | Vulnerable | Species or species habitat known to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| 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 | | |
| Aipysurus apraefrontalis | | |
| Short-nosed Seasnake [1115] | Critically Endangered | Species or species habitat known to occur within area |
| Caretta caretta | | |
| Loggerhead Turtle [1763] | Endangered | Breeding known to occur within area |
| Chelonia mydas | | |
| Green Turtle [1765] | Vulnerable | Breeding known to occur within area |
| Ctenotus zastictus | | |
| Hamelin Ctenotus [25570] | Vulnerable | Species or species habitat likely to occur within area |
| Dermochelys coriacea | | |
| Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Foraging, feeding or related behaviour 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 |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | habitat likely to occur within area |
| Ardenna carneipes<br>Flesh-footed Shearwater, Fleshy-footed Shearwater [82404] | | Species or species habitat likely to occur within area |
| Ardenna pacifica<br>Wedge-tailed Shearwater [84292] | | Breeding known to occur within area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat likely to occur within area |
| Fregata ariel<br>Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat known to occur within area |
| Fregata minor<br>Great Frigatebird, Greater Frigatebird [1013] | | Species or species habitat may occur within area |
| Hydroprogne caspia<br>Caspian Tern [808] | | Breeding known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Onychoprion anaethetus<br>Bridled Tern [82845] | | Breeding known to occur within area |
| Sterna dougallii<br>Roseate Tern [817] | | Breeding known to occur within area |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Species or species habitat may occur within area |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris<br>Black-browed Albatross [66472] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche steadi<br>White-capped Albatross [64462] | Vulnerable | Species or species habitat may occur within area |
| Migratory Marine Species | | |
| Anoxypristis cuspidata<br>Narrow Sawfish, Knifetooth Sawfish [68448] | | Species or species habitat likely to occur within area |
| Balaena glacialis australis<br>Southern Right Whale [75529] | Endangered* | Species or species habitat likely to occur within area |
| Balaenoptera bonaerensis<br>Antarctic Minke Whale, Dark-shoulder Minke Whale [67812] | | Species or species habitat likely to occur within area |
| Balaenoptera borealis<br>Sei Whale [34] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat likely to occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Migration route known to |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | occur within area |
| Balaenoptera physalus<br>Fin Whale [37] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Carcharhinus longimanus<br>Oceanic Whitetip Shark [84108] | | Species or species habitat likely to occur within area |
| Carcharodon carcharias<br>White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat known to occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Breeding known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Breeding known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Foraging, feeding or related behaviour known to occur within area |
| Dugong dugon<br>Dugong [28] | | Breeding known to occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Breeding known to occur within area |
| Isurus oxyrinchus<br>Shortfin Mako, Mako Shark [79073] | | Species or species habitat likely to occur within area |
| Isurus paucus<br>Longfin Mako [82947] | | Species or species habitat likely to occur within area |
| Lamna nasus<br>Porbeagle, Mackerel Shark [83288] | | Species or species habitat may occur within area |
| Manta alfredi<br>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<br>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<br>Humpback Whale [38] | Vulnerable | Breeding known to occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Breeding known to occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat may occur within area |
| Physeter macrocephalus<br>Sperm Whale [59] | | Species or species habitat may occur within area |
| Pristis clavata<br>Dwarf Sawfish, Queensland Sawfish [68447] | Vulnerable | Species or species habitat known to occur within area |
| Pristis zijsron<br>Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442] | Vulnerable | Species or species habitat known to occur within area |
| Rhincodon typus<br>Whale Shark [66680] | Vulnerable | Foraging, feeding or |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | related behaviour known to occur within area |
| [Sousa chinensis](#)<br>Indo-Pacific Humpback Dolphin [50] | | Species or species habitat known to occur within area |
| [Tursiops aduncus (Arafura/Timor Sea populations)](#)<br>Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900] | | Species or species habitat known to occur within area |
| **Migratory Terrestrial Species** | | |
| [Hirundo rustica](#)<br>Barn Swallow [662] | | Species or species habitat known to occur within area |
| [Motacilla cinerea](#)<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| [Motacilla flava](#)<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |
| [Actitis hypoleucos](#)<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| [Calidris acuminata](#)<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area |
| [Calidris canutus](#)<br>Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| [Calidris ferruginea](#)<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| [Calidris melanotos](#)<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| [Charadrius veredus](#)<br>Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area |
| [Glareola maldivarum](#)<br>Oriental Pratincole [840] | | Species or species habitat may occur within area |
| [Limosa lapponica](#)<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| [Numenius madagascariensis](#)<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| [Pandion haliaetus](#)<br>Osprey [952] | | Breeding known to occur within area |
| [Thalasseus bergii](#)<br>Crested Tern [83000] | | Breeding known to occur within area |
| [Tringa nebularia](#)<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

# Other Matters Protected by the EPBC Act

## Commonwealth Land [ Resource Information ]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

| Name |
|---|
| Commonwealth Land - |
| Defence - EXMOUTH ADMIN & HF TRANSMITTING |
| Defence - EXMOUTH VLF TRANSMITTER STATION |
| Defence - LEARMONTH - RAAF BASE |
| Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH |

## Commonwealth Heritage Places [ Resource Information ]

| Name | State | Status |
|---|---|---|
| Natural | | |
| Ningaloo Marine Area - Commonwealth Waters | WA | Listed place |

## Listed Marine Species [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| Birds | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Anous stolidus<br>Common Noddy [825] | | Species or species habitat likely to occur within area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba<br>Great Egret, White Egret [59541] | | Breeding known to occur within area |
| Ardea ibis<br>Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat likely to occur within area |
| Charadrius veredus<br>Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area |
| Chrysococcyx osculans<br>Black-eared Cuckoo [705] | | Species or species habitat known to occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Fregata ariel<br>Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat known to occur within area |
| Fregata minor<br>Great Frigatebird, Greater Frigatebird [1013] | | Species or species habitat may occur within area |
| Glareola maldivarum<br>Oriental Pratincole [840] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat known to occur within area |
| Hirundo rustica<br>Barn Swallow [662] | | Species or species habitat known to occur within area |
| Larus novaehollandiae<br>Silver Gull [810] | | Breeding known to occur within area |
| Larus pacificus<br>Pacific Gull [811] | | Foraging, feeding or related behaviour known to occur within area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| Pandion haliaetus<br>Osprey [952] | | Breeding known to occur within area |
| Pterodroma mollis<br>Soft-plumaged Petrel [1036] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Puffinus carneipes<br>Flesh-footed Shearwater, Fleshy-footed Shearwater [1043] | | Species or species habitat likely to occur within area |
| Puffinus pacificus<br>Wedge-tailed Shearwater [1027] | | Breeding known to occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat likely to occur within area |
| Sterna anaethetus<br>Bridled Tern [814] | | Breeding known to occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Sterna bengalensis<br>Lesser Crested Tern [815] | | Breeding known to occur within area |
| Sterna bergii<br>Crested Tern [816] | | Breeding known to occur within area |
| Sterna caspia<br>Caspian Tern [59467] | | Breeding known to occur within area |
| Sterna dougallii<br>Roseate Tern [817] | | Breeding known to occur within area |
| Sterna fuscata<br>Sooty Tern [794] | | Breeding known to occur within area |
| Sterna nereis<br>Fairy Tern [796] | | Breeding known to occur within area |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Species or species habitat may occur within area |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris<br>Black-browed Albatross [66472] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche steadi<br>White-capped Albatross [64462] | Vulnerable | Species or species habitat may occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |
| **Fish** | | |
| Acentronura larsonae<br>Helen's Pygmy Pipehorse [66186] | | Species or species habitat may occur within area |
| Bulbonaricus brauni<br>Braun's Pughead Pipefish, Pug-headed Pipefish [66189] | | Species or species habitat may occur within area |
| Campichthys galei<br>Gale's Pipefish [66191] | | Species or species habitat may occur within area |
| Campichthys tricarinatus<br>Three-keel Pipefish [66192] | | Species or species habitat may occur within area |
| Choeroichthys brachysoma<br>Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194] | | Species or species habitat may occur within area |
| Choeroichthys latispinosus<br>Muiron Island Pipefish [66196] | | Species or species habitat may occur within area |
| Choeroichthys suillus<br>Pig-snouted Pipefish [66198] | | Species or species habitat may occur within area |
| Corythoichthys flavofasciatus<br>Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200] | | Species or species habitat may occur within area |
| Cosmocampus banneri<br>Roughridge Pipefish [66206] | | Species or species |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | habitat may occur within area |
| Doryrhamphus dactyliophorus<br>Banded Pipefish, Ringed Pipefish [66210] | | Species or species habitat may occur within area |
| Doryrhamphus excisus<br>Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211] | | Species or species habitat may occur within area |
| Doryrhamphus janssi<br>Cleaner Pipefish, Janss' Pipefish [66212] | | Species or species habitat may occur within area |
| Doryrhamphus multiannulatus<br>Many-banded Pipefish [66717] | | Species or species habitat may occur within area |
| Doryrhamphus negrosensis<br>Flagtail Pipefish, Masthead Island Pipefish [66213] | | Species or species habitat may occur within area |
| Festucalex scalaris<br>Ladder Pipefish [66216] | | Species or species habitat may occur within area |
| Filicampus tigris<br>Tiger Pipefish [66217] | | Species or species habitat may occur within area |
| Halicampus brocki<br>Brock's Pipefish [66219] | | Species or species habitat may occur within area |
| Halicampus grayi<br>Mud Pipefish, Gray's Pipefish [66221] | | Species or species habitat may occur within area |
| Halicampus nitidus<br>Glittering Pipefish [66224] | | Species or species habitat may occur within area |
| Halicampus spinirostris<br>Spiny-snout Pipefish [66225] | | Species or species habitat may occur within area |
| Haliichthys taeniophorus<br>Ribboned Pipehorse, Ribboned Seadragon [66226] | | Species or species habitat may occur within area |
| Hippichthys penicillus<br>Beady Pipefish, Steep-nosed Pipefish [66231] | | Species or species habitat may occur within area |
| Hippocampus angustus<br>Western Spiny Seahorse, Narrow-bellied Seahorse [66234] | | Species or species habitat may occur within area |
| Hippocampus histrix<br>Spiny Seahorse, Thorny Seahorse [66236] | | Species or species habitat may occur within area |
| Hippocampus kuda<br>Spotted Seahorse, Yellow Seahorse [66237] | | Species or species habitat may occur within area |
| Hippocampus planifrons<br>Flat-face Seahorse [66238] | | Species or species habitat may occur within area |
| Hippocampus spinosissimus<br>Hedgehog Seahorse [66239] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Hippocampus trimaculatus<br>Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720] | | Species or species habitat may occur within area |
| Lissocampus fatiloquus<br>Prophet's Pipefish [66250] | | Species or species habitat may occur within area |
| Micrognathus micronotopterus<br>Tidepool Pipefish [66255] | | Species or species habitat may occur within area |
| Nannocampus subosseus<br>Bonyhead Pipefish, Bony-headed Pipefish [66264] | | Species or species habitat may occur within area |
| Phoxocampus belcheri<br>Black Rock  Pipefish [66719] | | Species or species habitat may occur within area |
| Solegnathus hardwickii<br>Pallid Pipehorse, Hardwick's Pipehorse [66272] | | Species or species habitat may occur within area |
| Solegnathus lettiensis<br>Gunther's Pipehorse, Indonesian Pipefish [66273] | | Species or species habitat may occur within area |
| Solenostomus cyanopterus<br>Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183] | | Species or species habitat may occur within area |
| Stigmatopora argus<br>Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276] | | Species or species habitat may occur within area |
| Syngnathoides biaculeatus<br>Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279] | | Species or species habitat may occur within area |
| Trachyrhamphus bicoarctatus<br>Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280] | | Species or species habitat may occur within area |
| Trachyrhamphus longirostris<br>Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281] | | Species or species habitat may occur within area |
| **Mammals** | | |
| Dugong dugon<br>Dugong [28] | | Breeding known to occur within area |
| **Reptiles** | | |
| Acalyptophis peronii<br>Horned Seasnake [1114] | | Species or species habitat may occur within area |
| Aipysurus apraefrontalis<br>Short-nosed Seasnake [1115] | Critically Endangered | Species or species habitat known to occur within area |
| Aipysurus duboisii<br>Dubois' Seasnake [1116] | | Species or species habitat may occur within area |
| Aipysurus eydouxii<br>Spine-tailed Seasnake [1117] | | Species or species habitat may occur within area |
| Aipysurus laevis<br>Olive Seasnake [1120] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Aipysurus pooleorum<br>Shark Bay Seasnake [66061] | | Species or species habitat may occur within area |
| Aipysurus tenuis<br>Brown-lined Seasnake [1121] | | Species or species habitat may occur within area |
| Astrotia stokesii<br>Stokes' Seasnake [1122] | | Species or species habitat may occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Breeding known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Breeding known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Foraging, feeding or related behaviour known to occur within area |
| Disteira kingii<br>Spectacled Seasnake [1123] | | Species or species habitat may occur within area |
| Disteira major<br>Olive-headed Seasnake [1124] | | Species or species habitat may occur within area |
| Emydocephalus annulatus<br>Turtle-headed Seasnake [1125] | | Species or species habitat may occur within area |
| Ephalophis greyi<br>North-western Mangrove Seasnake [1127] | | Species or species habitat may occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Breeding known to occur within area |
| Hydrophis czeblukovi<br>Fine-spined Seasnake [59233] | | Species or species habitat may occur within area |
| Hydrophis elegans<br>Elegant Seasnake [1104] | | Species or species habitat may occur within area |
| Hydrophis ornatus<br>Spotted Seasnake, Ornate Reef Seasnake [1111] | | Species or species habitat may occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Breeding known to occur within area |
| Pelamis platurus<br>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<br>Minke Whale [33] | | Species or species habitat may occur within area |
| Balaenoptera bonaerensis<br>Antarctic Minke Whale, Dark-shoulder Minke Whale [67812] | | Species or species habitat likely to occur |

| Name | Status | Type of Presence |
|---|---|---|
| | | within area |
| Balaenoptera borealis<br>Sei Whale [34] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat likely to occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Migration route known to occur within area |
| Balaenoptera physalus<br>Fin Whale [37] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Delphinus delphis<br>Common Dophin, Short-beaked Common Dolphin [60] | | Species or species habitat may occur within area |
| Eubalaena australis<br>Southern Right Whale [40] | Endangered | Species or species habitat likely to occur within area |
| Feresa attenuata<br>Pygmy Killer Whale [61] | | Species or species habitat may occur within area |
| Globicephala macrorhynchus<br>Short-finned Pilot Whale [62] | | Species or species habitat may occur within area |
| Grampus griseus<br>Risso's Dolphin, Grampus [64] | | Species or species habitat may occur within area |
| Indopacetus pacificus<br>Longman's Beaked Whale [72] | | Species or species habitat may occur within area |
| Kogia breviceps<br>Pygmy Sperm Whale [57] | | Species or species habitat may occur within area |
| Kogia simus<br>Dwarf Sperm Whale [58] | | Species or species habitat may occur within area |
| Lagenodelphis hosei<br>Fraser's Dolphin, Sarawak Dolphin [41] | | Species or species habitat may occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | Vulnerable | Breeding known to occur within area |
| Mesoplodon densirostris<br>Blainville's Beaked Whale, Dense-beaked Whale [74] | | Species or species habitat may occur within area |
| Mesoplodon ginkgodens<br>Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564] | | Species or species habitat may occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat may occur within area |
| Peponocephala electra<br>Melon-headed Whale [47] | | Species or species habitat may occur within area |
| Physeter macrocephalus<br>Sperm Whale [59] | | Species or species |

| Name | Status | Type of Presence |
|---|---|---|
| | | habitat may occur within area |
| Pseudorca crassidens<br>False Killer Whale [48] | | Species or species habitat likely to occur within area |
| Sousa chinensis<br>Indo-Pacific Humpback Dolphin [50] | | Species or species habitat known to occur within area |
| Stenella attenuata<br>Spotted Dolphin, Pantropical Spotted Dolphin [51] | | Species or species habitat may occur within area |
| Stenella coeruleoalba<br>Striped Dolphin, Euphrosyne Dolphin [52] | | Species or species habitat may occur within area |
| Stenella longirostris<br>Long-snouted Spinner Dolphin [29] | | Species or species habitat may occur within area |
| Steno bredanensis<br>Rough-toothed Dolphin [30] | | Species or species habitat may occur within area |
| Tursiops aduncus<br>Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418] | | Species or species habitat likely to occur within area |
| Tursiops aduncus (Arafura/Timor Sea populations)<br>Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900] | | Species or species habitat known to occur within area |
| Tursiops truncatus s. str.<br>Bottlenose Dolphin [68417] | | Species or species habitat may occur within area |
| Ziphius cavirostris<br>Cuvier's Beaked Whale, Goose-beaked Whale [56] | | Species or species habitat may occur within area |

| Australian Marine Parks | [ Resource Information ] |
|---|---|
| Name | Label |
| Gascoyne | Habitat Protection Zone (IUCN IV) |
| Gascoyne | Multiple Use Zone (IUCN VI) |
| Gascoyne | National Park Zone (IUCN II) |
| Montebello | Multiple Use Zone (IUCN VI) |
| Ningaloo | National Park Zone (IUCN II) |
| Ningaloo | Recreational Use Zone (IUCN IV) |
| Shark Bay | Multiple Use Zone (IUCN VI) |

## Extra Information

| State and Territory Reserves | [ Resource Information ] |
|---|---|
| Name | State |
| Barrow Island | WA |
| Bessieres Island | WA |
| Bundegi Coastal Park | WA |
| Cape Range | WA |
| Jurabi Coastal Park | WA |
| Muiron Islands | WA |
| Round Island | WA |
| Serrurier Island | WA |
| Unnamed WA37500 | WA |

| Name | State |
|---|---|
| Unnamed WA44665 | WA |
| Unnamed WA44688 | WA |
| Victor Island | WA |
| Y Island | WA |

## Invasive Species [ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Streptopelia senegalensis<br>Laughing Turtle-dove, Laughing Dove [781] | | Species or species habitat likely to occur within area |
| **Mammals** | | |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Capra hircus<br>Goat [2] | | Species or species habitat likely to occur within area |
| Equus caballus<br>Horse [5] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| **Plants** | | |
| Cenchrus ciliaris<br>Buffel-grass, Black Buffel-grass [20213] | | Species or species habitat likely to occur within area |
| Cylindropuntia spp.<br>Prickly Pears [85131] | | Species or species habitat likely to occur within area |
| **Reptiles** | | |
| Hemidactylus frenatus<br>Asian House Gecko [1708] | | Species or species habitat likely to occur within area |

## Nationally Important Wetlands [ Resource Information ]

| Name | State |
|---|---|
| Cape Range Subterranean Waterways | 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 |
| Exmouth Plateau | 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

-20.78296 115.34496,-21.51613 114.82181,-22.16245 114.23507,-22.23782 114.11514,-22.19015 114.08405,-21.78516 114.16532,-21.97509 113.93304,-22.5776 113.65418,-22.71744 113.67065,-22.84081 113.79186,-23.0959 113.65816,-23.12816 113.77069,-23.47005 113.77985,-23.6316 113.6136,-24.04319 113.42245,-24.55188 113.44554,-24.58761 113.25697,-24.38221 113.20303,-24.3127 112.99103,-24.47033 112.3492,-24.37541 111.97191,-24.04743 111.7726,-23.41614 111.61683,-21.9241 111.55394,-21.36258 111.60215,-20.84949 111.72957,-20.47143 111.88569,-20.18504 112.09976,-19.76885 112.60286,-19.40145 113.30858,-19.24518 113.94091,-19.24611 114.53181,-19.62947 115.24508,-19.6983 115.61305,-19.80771 115.71187,-20.13523 115.76156,-20.36577 115.46394,-20.78296 115.34496

# 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:

# STAKEHOLDER CONSULTATION RECORDS

| Stakeholder | Consultation Transcripts |
|---|---|
| **Australian Fisheries Management Authority (AFMA)** | **24.05.2021 - Follow up email sent regarding impacts to trawl fishing**<br>Dear Sir/Madam<br>On 4th May Eni contacted you regarding their plans to decommission the Woollybutt field. This correspondence stated that Eni were considering rock dumping over the Corkybark wellhead to mitigate snag risks that may be presented by leaving the wellhead in situ.<br>We are now writing to update AFMA following further consultation with the fishing industry. We have received feedback from State fisheries and the DPIRD on the proposal and the possibility of rock dumping over the Corkybark wellhead to reduce the snag risk. Both parties have advised that rock dumping or installation of other over trawlable structures is not preferred as there is no evidence that this would completely remove the snag risk. Therefore, the control that Eni will commit to in the Woollybutt Decommissioning EP is to mark the infrastructure on navigation charts. This is aligned with how snag risk from other oil and gas infrastructure is managed, particularly during construction.<br>If AFMA have any further comments please let me know by COB 28th May.<br>Thanks |
| | **04.05.2021 –Follow up email sent regarding impacts to trawl fishing**<br>Dear Sir/Madam,<br>Eni would like to follow up on the consultation information sent on the 9th and 24th of March 2021.<br>In particular, during earlier consultation in 2015, AFMA has expressed a preference "for all subsea equipment to be removed to minimise the prospect of interference with fishing gear especially trawl gear" (email attached).<br>The potential risk to trawl fishing has been assessed during the preparation of the Decommissioning EP and the P&A EP and assessment of decommissioning options. The Woollybutt field does not overlap any Commonwealth trawl fisheries, however it overlaps the WA Pilbara Trawl Fishery and is located within Zone 1 of the fishery, which has been closed to trawl fishing since 1998. Therefore, there is currently no risk to trawl gear. Eni is not aware of any plans to reopen the area to trawl fishing, however acknowledges this is a possibility and is liaising further with WA Fisheries and WAFIC.<br>To manage any future potential risks to trawl fishers, the following mitigation measures will be applied:<br>• Remaining infrastructure (umbilicals, flowlines, chains and buried anchors) will be marked on the nautical charts; and<br>We are also considering rock dumping over the Corkybark wellhead and are interested in your views on rock dumping to minimise snag risk.<br>Should Zone 1 be reopened to trawl fishing, the remaining infrastructure would exclude trawlers from an area <1% of the total area of Zone 1. Zone 1 and Zone 2, which remains open to trawl fishing, cover a total area of 1590 sq nm and 14,980 sq nm, respectively.<br>We welcome any further feedback you have on the project, and we are available to discuss the project in more detail should you have any further comments or concerns. |

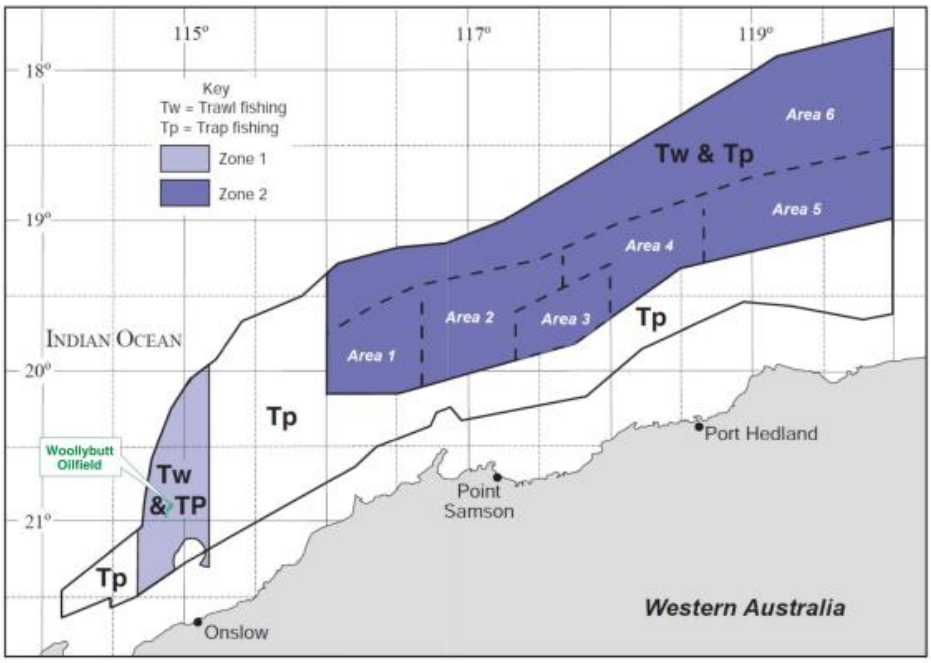



**Figure 6.9: Demersal Scalefish Fisheries of the Pilbara** (Source: DoF 2011)

**25.03.2021 –Consultation email sent (note, this was a follow-up email to the consultation on future Woollybutt decommissioning, including Corkybark-1 wellhead decommissioning with the overall future Woollybutt decommissioning scope consultation aims avoids over consultation with the interested parties)**

Dear Sir/Madam

Further to my email Eni have updated their decommissioning strategy and would like to inform you of one additional piece of infrastructure that is proposed to be decommissioned in situ, the Corkybark wellhead.

The Corkybark well is an abandoned exploration well, located within the Woollybutt field at the following coordinates:

| Eastings | Northings | Longitude | Latitude |
|---|---|---|---|
| 289233 | 7688393 | 114.9736806 | -20.8928668 |

The figure showing the location of the Woollybutt field is attached.

In 2000 Eni attempted to remove the wellhead, however due to technical and safety issues the wellhead could not be completely removed. The portion of the wellhead that was unable to be removed remains on the seabed, extending up to 1.3m in height. The wellhead is comprised entirely of steel and does not contain any operational fluids or plastics. A photo showing the Corkybark wellhead is also attached.

As part of Eni's strategy for decommissioning the Woollybutt field, they are seeking approval from NOPSEMA to leave Corkybark wellhead in situ. The potential impacts from this are detailed in the table below:

| Environmental Risk and/or Impact | Risk Description |
|---|---|
| Interaction with other marine users | Leaving the Corkybark wellhead in situ will result in a long term physical presence on the seabed. This has potential to interact with other marine users, particularly those who have activities that also interact with the seabed.<br>These potential impacts will be assessed in the EP and will include mitigation measures such as long term identification of infrastructure on marine charts. |
| Discharge of material to the marine environment | Long term degradation of the Corkybark wellhead may occur.<br>As the wellhead corrodes and degrades the constituents making up the wellhead will be released to the environment. Iron, the main consistent of wellheads (about 98%) is not considered a significant contaminate in the marine environment. Other constituents represent less than 2% of the |

| | |
|---|---|
| | wellhead's composition and impacts to marine environment from these is extremely low.<br>Degradation modelling of the wellhead has shown that it could take up to 250 years to corrode.<br>The EP will assess the potential impacts to the marine environment from the breakdown of materials. |
| Benefits to benthic habitats | Observations of the Woollybutt infrastructure indicate that benthic habitat has become established. This is expected to provide ongoing benefits to benthic habitats in the Woollybutt field area.<br>Fish habitat studies are underway to quantify the benefit that the long term presence of the subsea infrastructure may have on benthic habitats and an assessment of this will be provided in the EP. |

Eni are now also seeking your feedback on the Corkybark wellhead being left in situ in addition to the infrastructure already communicated in previous correspondence, being:

- DSPM anchors and chains
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers
- Umbilical crossing mattresses

Our original correspondence sought feedback by the 31st March 2021, however we have now extended this to the 16th April 2021 to allow for this additional information to be considered.

Thanks

**25.09.2020 –Consultation letter emailed (**HSE.LT.5427.STKH.TC**)**

**Stakeholder Consultation**

Eni Australia Limited (Eni) is currently undertaking ongoing field management activities within the Woollybutt field, located in Production Licence WA-25-L within Commonwealth waters. Woollybutt production ceased in 2012 and all associated subsea equipment remains in the Woollybutt field and within a 500 m Petroleum Safety Zone (PSZ).

Eni has an Environment Plan (EP) in place for the current ongoing field management activities, which was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in 2019.

Eni is submitting a revised EP to NOPSEMA for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (the regulations) to reflect the current status of the subsea field infrastructure, the proposed P&A activities and the proposed recovery of certain subsea production equipment.

Consultation material provided in 2015, 2016 and 2019 has kept stakeholders informed regarding the status of the Woollybutt field and future plans. This consultation bulletin provides an update on ongoing field management, field status and proposed plug and abandonment (P&A) and equipment recovery activities.

**Current status of equipment**

In January 2020, during visual inspection by a remotely operated vehicle (ROV), the Woollybutt Disconnectable Single Point Mooring (DSPM) was noted to have sunk to the seabed from its previous location at 35 m water depth due to a buoyancy failure.

In August 2020, one mid-depth buoy (MDB) was noted to have risen to the sea surface from its previous location at 50 m water depth, due to tether failure.

The floating buoy remains stationary within the 500 m Petroleum Safety Zone and is under 24-hour surveillance by a dedicated vessel on location. Inspection confirms there is no evidence of hydrocarbon release. At the time of writing, remediation planning is ongoing to remove the hazard.

All other subsea production equipment, including the second MDB, remains in place within the Woollybutt Field 500 m PSZ.

**Location**

The Woollybutt field is located in production license WA-25-L in approximately 100 m of water, 65 km north of Onslow and 35 km west of Barrow Island (Attachment 1) within Commonwealth waters. A summary of the key field infrastructure, locations and status are provided in Table 1.

The Woollybutt field subsea infrastructure are marked on nautical charts surrounded by a 500 m Petroleum Safety Zone (PSZ), which excludes other marine users from the area (Attachment 2).

**Table 1: Summary of the Key Woollybutt Infrastructure**

| Infrastructure | Longitude | Latitude | Status |
|---|---|---|---|
| Scallybutt-1 well (SB1) | 114 53.447 | -20 55.078 | Shut-in production wells to be P&A. |
| Woollybutt-4 well (WB4) | 114 52.102 | -20 53.27 | |
| Woollybutt-2A well (WB2A) | 114 54.373 | -20 55.069 | |
| Woollybutt-1 well (WB1) | 114 54.524 | -20 54.266 | |
| Woollybutt-3A (WB3A) | 114 52.406 | -20 58.043 | Suspended wells – may be included in P&A campaign. |
| Woollybutt-5A (WB5A) | 114 51.703 | -21 00.000 | |
| Disconnectable Single Point Mooring (DSPM) | 114 54.441 | -20 54.599 | The DSPM is currently located on the seabed, located within the 500 m PSZ. |
| Mid-depth buoy (north), chains and gravity base | 114 54.450 | -20 54.582 | The northern mid-depth buoy is currently floating on the sea surface within the 500 m PSZ and is under 24-hour surveillance. |
| Mid-depth buoy (south), chains and gravity base | 114 54.444 | -20 54.646 | The southern mid-depth buoy remains in place at 50 m water depth. |

**Activities**

The revised EP includes activities relating to the field management, well plug and abandonment (P&A) activities and recovery of certain subsea production equipment.

Activities undertaken as part of the scope of the revised EP are presented in Table 2.

**Table 2: Summary of Activities**

| Activity | Summary | Frequency and duration |
|---|---|---|
| Field Management | Use of remotely operated vehicles (ROV) deployed from a vessel to perform field management scopes, including:<br>• Cathodic Protection (CP) surveys;<br>• General Visual Inspections (GVI);<br>• Inspection, monitoring, maintenance and repair (IMMR). | On an ongoing basis, as per the Eni Integrity Management Plan (IMP) strategy. Typically undertaken in 7-14 days. |
| P&A | Mobilisation of an Intervention Vessel (IV) to the field with integrated services to perform well P&A on four to six wells. Logistical support is provided by up to three offshore support vessels and helicopter services.<br>Well P&A activities will include the setting of plugs and cement barriers at specified depths in the wells to act as | Target execution window is 2Q 2021 – 2Q 2022[1]. It is anticipated P&A of each well will take approximately 10-20 days. |

| | | |
|---|---|---|
| | permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment. Following plugging, wellheads will be cut at the seabed and retrieved. | |
| Recovery of subsea production equipment | The recovery of subsea production equipment will be undertaken using the IV and support vessels. The following equipment is proposed to be recovered from the field and taken to shore for disposal, recycling or reuse, in accordance with applicable legislation:<br>• Mid-depth buoys, chains/tether and gravity bases;<br>• Disconnectable Single Point Mooring;<br>• Subsea structures (including manifolds and umbilical termination assemblies).<br>During the activity, anchors, chains, flowlines and umbilicals will be disconnected, and remain in situ until future decommissioning. | Target execution window for mid-depth buoy removal is Q4 2020[1].<br>Removal of DSPM and listed subsea structures to follow the P&A campaign and anticipated to take approximately 20-30 days. |

Note 1: subject to project variables including but not limited to vessel availability, regulatory approvals and weather.

**Environmental Management**

Eni assessed the environmental risk assessment for the ongoing field management, proposed P&A activities and removal of subsea production equipment, giving consideration to activity timing, durations, location and potential environmental impacts. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

Table 3 provides a summary of potential key environmental risk and/or impacts and associated management measures identified.

**Table 3: Potential Key Environmental Risks and Management Measures**

| Environmental Risk and/or Impact | Risk Description | Mitigation and/or Management Measure |
|---|---|---|
| Interaction with other users – vessels and subsea equipment | Presence of vessels and the 500 m PSZ in the field may exclude other marine users from the area. | Eni will notify regulatory authorities and marine users on the activities as required. |
| Routine marine discharges | Vessels will discharge water, cooling water and sewage/grey water to the marine environment. | All routine marine discharges will be managed according to legislative requirements. |
| Chemical use / discharge | Minor quantities of chemicals will be released to the marine environment during field management, P&A and recovery of subsea equipment. | Chemical use will be managed in accordance with an environmental selection process. |
| Seabed disturbance | Removal of subsea infrastructure will disturb the area in which the equipment was once placed. | Procedures will be followed to limit seabed disturbance during recovery of subsea equipment. |
| Floating mid-depth buoy interaction with other users | Movement of the floating mid-depth buoy outside of the 500 m PSZ could present a navigational hazard to other users. | The floating mid-depth buoy is under 24-hour surveillance and will be removed and disposed of onshore in accordance with legislative requirements. |
| Marine fauna interaction | Vessels used for the activities have the potential to interact with marine fauna (e.g. collisions). | Measures will be taken to protect marine fauna from vessel activities. |

| | | |
|---|---|---|
| Loss of containment | Loss of containment of hydrocarbons to the marine environment may occur during refuelling at sea or in the event of a vessel collision or a loss of well control / well leak. | Appropriate fuel transfer procedures and equipment will be used to prevent spills<br>Procedures to reduce the potential for uncontrolled hydrocarbon releases will be followed.<br>Response plans and equipment will be in place and maintained to manage spills to the environment. |
| Introduction of marine pest species | Introduction and establishment of invasive marine pests to the area via vessels ballast water or biofouling on vessel hulls. | All vessels will be assessed and managed as appropriate to prevent the introduction of marine pests.<br>Vessels will comply with biosecurity requirements. |

**Future Decommissioning**

Decommissioning of the remaining Woollybutt field subsea components (anchors, chains, four non-production well heads, flowlines and umbilicals) will be subject of a separate EP.

Until decommissioning, field management will be ongoing to maintain remaining components in accordance with Section 572 of the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGS Act). Remaining flowlines range from 2½" to 6" in diameter and approximately 20 km in total length, and umbilicals are 3½" in diameter and approximately 8 km in total length.

A comparative assessment process has been undertaken to evaluate a range of decommissioning options for the remaining components, including complete removal, partial removal and leave insitu. Options were assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks. The assessment has determined that leaving the remaining components insitu would provide the best overall outcome. In particular, the equipment would continue to provide hard substrate for marine habitat growth on an otherwise featureless seabed.

Studies are ongoing and stakeholder feedback will be taken into consideration.

**Stakeholder Comment and Feedback**

Your comment is sought in relation to any potential impact that the ongoing field management, proposed well P&A activities and recovery of subsea production equipment may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 26 October 2020 to the contact details provided below.

Eni also seeks any comment from stakeholders regarding insitu decommissioning of remaining subsea components, and whether they would like to continue to be consulted in these matters as the decommissioning EP is developed.

All comments provided will be considered in the respective revision of Eni's Woollybutt EP to be submitted to NOPSEMA, in accordance with the OPGGS Act.

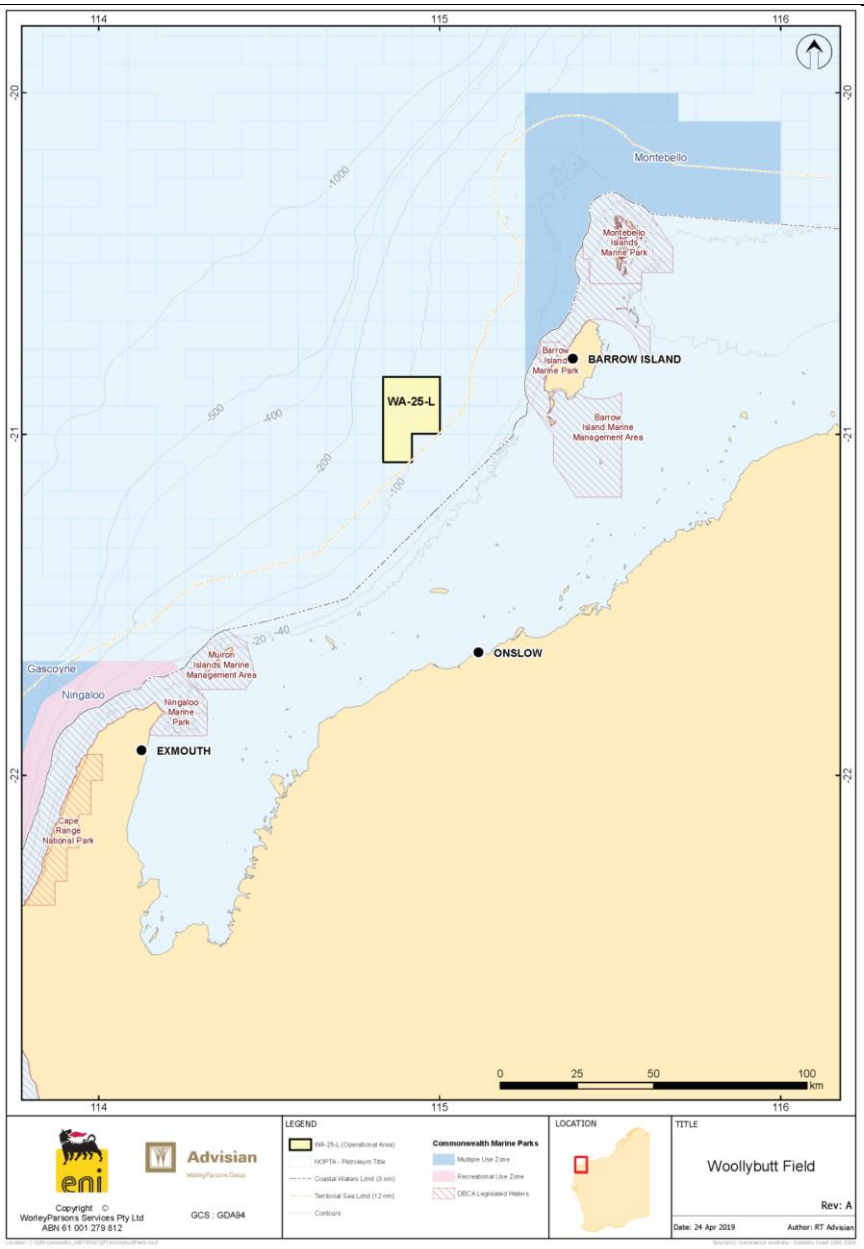
All communications in relation to this should be directed to:

Email: info@eniaustralia.com.au

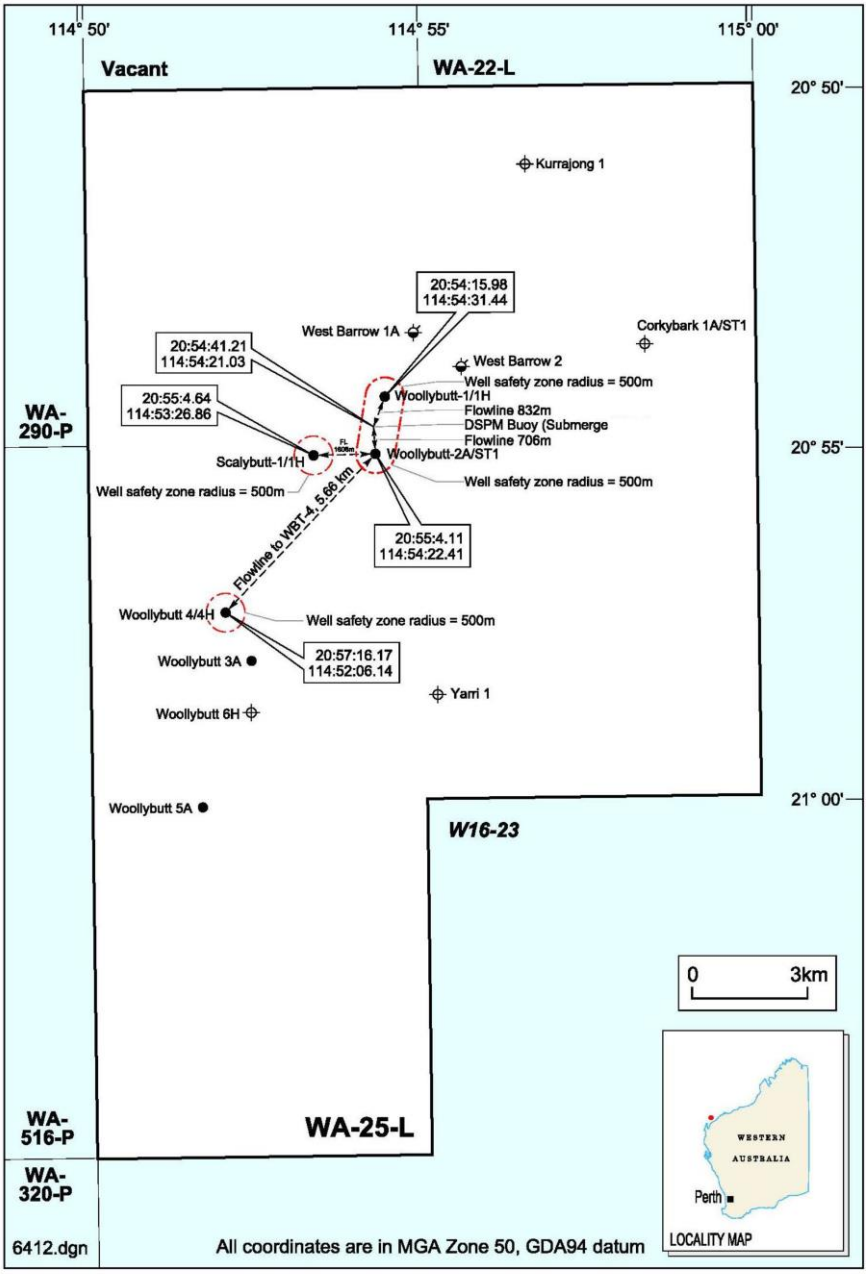
Post: PO Box 6862

East Perth WA 6892

Phone: (08) 9320 1132




**Attachment 1: Location of WA-25 L**




**Attachment 2: Woollybutt Field 500m Petroleum Safety Zone**

**11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5427.STKH.TC**)**

**Stakeholder Consultation**

**Woollybutt Oil Field Operations and Plug and Abandonment Environment Plan Revision**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package outlines the ongoing field management and proposed intervention and Plug and Abandonment (P&A) activities of up to seven wells within the field. The Woollybutt field is currently operating under an in-force Environment Plan (EP), approved until 2022. The EP is currently being updated to include the P&A activities. Subsequent decommissioning activities of subsea equipment will be the subject of a future EP submission and is not covered by this Stakeholder Consultation Package.

Consultation material provided in 2015, 2016 and 2018 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. The consultation material provided below provides an update to the ongoing field management and P&A activities proposed.

Your comment is sought in relation to any potential impact that the ongoing field management and the proposed P&A activities may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 9 April 2019 to the contact details provided below.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted].

Email: [redacted]

Post: PO Box 6862 East Perth WA 6892

Phone: (08) 9320 1132

Yours sincerely

_____

[redacted]

Deputy Operations Manager

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone
3. Table 3: Commonwealth Fisheries

**Activity location**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

Coordinates of the confirmed and additional wells subject to P&A activities are detailed in Table 1. A petroleum safety zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the Mobile Offshore Drilling Unit (MODU) and wells during the P&A activities (Figure 2).

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Activities**

The activity involves the field management and P&A of four shut-in production wells and up to three additional abandoned wells (all within WA-25) as detailed above, within the Woollybutt field.

Field management comprises of:

- Annual ROV surveys prior to P&A activities, lasting for a duration of 3-7 days, utilising one project vessel;

- ROV surveys every ~2 years after P&A, until decommissioning, lasting for a duration of 3-7 days, utilising one project vessel.

P&A activities comprise of two campaigns:

- Mobilisation of a Light Well Intervention Vessel (LWIV) to set plugs and cement barriers at specified depths within WB-4 and possibly also WB-1 well. The LWIV will be on location for up to 10 years per well, P&A activity on WB-4 and WB-1 may occur post intervention using the LWIV, providing the intervention schedule allows. Otherwise these wells will be included in the MODU P&A, detailed below;
- Mobilisation of a MODU and up to three support vessels to plug the remaining wells (and WB-4 and WB-1, in the event they are not P&A post intervention using the LWIV). A MODU and up to three support vessels will be on location at each well for up to 20-30 days.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Timing and vessel details**

The intervention of the WB4 well and possibly WB-1, prior to P&A activities is anticipated to be undertaken in Q4 2019.

For the P&A activities, ENI anticipates that the program will commence in 2021, the MODU and up to 3 support vessels will be on location at each well for up to 20-30 days and the entire program will be completed within 150 days.

Further detail can be communicated to relevant stakeholders and Government maritime agencies prior to commencement.

**Interactions with Fisheries**

The Activity Area overlaps with the following Commonwealth fisheries (Table 3).

- Western Tuna and Billfish Fishery
- Southern Bluefin Tuna Fishery
- Western Skipjack Fishery

**Environmental Management**

Eni has undertaken a risk assessment for the ongoing field management and the proposed P&A program. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users from the presence of vessels:<br>Impacts to shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the developm of this EP.<br>• Appropriate navigation and radio equipment available on board all proje vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and rad equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells.<br>• Eni will notify relevant stakeholders, including fisheries stakeholders, an Government maritime safety agencies of specific start and end dates of activities, which will include specific vessel-on-location dates and any exclusion zones prior to commencement of the activities. |
| Seabed disturbance from anchoring of vessels | • Designated areas for anchoring will be identified to reduce potential imp on benthic habitats in the area. |
| Introduction of marine pest species (from vessel ballast water or biofouling) | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast W Management Requirements. |
| Hydrocarbon release due to:<br>• Subsea release of crude from loss of well control | • Appropriate spill response plans, equipment and materials will be in plac and maintained.<br>• Adherence to well control procedures.<br>• MODU anchored to prevent drifting off location during P&A activity<br>• All vessels will have a SOPEP that will be implemented immediately in th event of a hydrocarbon spill. |

| | |
|---|---|
| • diesel release as a result of vessel collision | • Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**.<br>• In the unlikely event of an oil spill or unplanned discharge into the environment, relevant agencies and organisations will be notified as appropriate to the nature and scale of the event, as soon as practicable following the occurrence.<br>Oil spill response strategies will be assessed based on potential impact to identified key receptor locations and sensitivities, which includes fish spawning and nursery areas. |
| Marine fauna interactions with vessels and activities resulting in potential:<br>Vessel collision, noise impacts, light impacts, impacts resulting from atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately i the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing o garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed o onshore by a licensed Waste Management Contractor (excluding putrescibl waste and sewage). |

**22/03/2019 – Follow up email sent**

To whom it may concern,

Further to my email below requesting feedback on the planned petroleum activities we have recently received feedback from the WA Fishing Industry Council. They have stated that there is one active licence holder in the Western Tuna and Billfish Fishery which could potentially be impacted by the proposed activities and they have requested we consult with them.

Could you please advise the process for obtaining the contact details of this particular licence holder and any feedback you may have on the proposed activities.

Best regards,

**22/03/2019 – email response received**

**UNCLASSIFIED**

[redacted]

Lists of Commonwealth Concession holders in each fishery can be found on the AFMA website at: http://www.afma.gov.au/fisheries-services/concession-holders-conditions/

Once you have identified relevant operators you can request their individual contact details through [redacted] There is a cost associated with this service and the total price will depend on the complexity of the request.

At this stage we no further feedback to provide.

Regards

[redacted]

[redacted]

Policy Environment Economics and Research

Australian Fisheries Management Authority

**01.05.2018 – Consultation letter sent (OPS.LT.5112.AFMA.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| Confirmed wells to be plug and abandoned | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |

| | | |
|---|---|---|
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the developm of this EP.<br>• Appropriate navigation and radio equipment available on board all proje vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and rad equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential imp on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast W Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in plac and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in th unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in th event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |

| | |
|---|---|
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately i the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing o garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed o onshore by a licensed Waste Management Contractor (excluding putrescibl waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], Social Responsibility Officer.

Email: [redacted]

Post: [redacted]

Phone: [redacted]

Yours sincerely

[redacted]

Deputy Operations Manager

Attachments:

4. Figure 1: Location of WA-25 L with depths
5. Figure 2: Woollybutt Field – 500m Exclusion Zone

**21.07.2015 - Updated consultation letter (OPS.LT.3869.AFMA.RR) emailed**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the

market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachements*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**01.09.2015 - Follow up email sent**

Hi [redacted]

We don't seem to have had a reply from you on this (sent 21 July 2015).

Is this something that you would like to comment on or can we assume no concerns or issues for the Authority.

Best regards

[redacted]

**01.09.2015 - Response received via email**

[redacted]

Thanks for the opportunity to comment.

AFMA's clear preference is for all subsea equipment be removed to minimise the prospect of interference with fishing gear especially trawl gear.

Please ensure that industry operators in the area are consulted as part of this process.

[redacted]

[redacted]

Policy, Environment, Economics and Research Section

Australian Fisheries Management Authority

**06.09.2016 - Letter (OPS.LT.4588.AFMA.TC) emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.

In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:

- The field has been monitored through in-field surveys, most recently in August 2016.
- Wells are scheduled to be permanently plugged in 2018.

| | |
|---|---|
| | • The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed [redacted].<br>Email: [redacted]<br>Post: [redacted]<br>Phone: [redacted]<br>Yours sincerely<br>[redacted]<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **AHO** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **25.09.2020 – Email received from AHO**<br>Please accept this email as acknowledgement that your email has been received by the AHO. The data you supplied will now be registered, assessed, prioritised and validated in preparation for updating our Navigational Charting products. These adhere to International and Australian Charting Specifications and standards. These standards may result in some data generalisation or filtering due to the scale of existing charts, proximity to other features, and the level of risk a reported feature presents to mariners.<br>Australian Hydrographic Service<br>[redacted]<br>[redacted] |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **8.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |
| | **07.05.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Thank you for emailing the Australian Hydrographic Service (AHS) Data Centre.<br>Please accept this email as acknowledgement that your email has been received by the AHS.<br>Kind Regards<br>Australian Hydrographic Service |
| | **04.05.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Apologies, comments are sought prior to the 31 May 2018<br>Regards<br>[redacted] |
| | **04.05.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni* |

To Whom it May Concern

Eni Australia is planning the decommissioning of the Woollybutt Field and as a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached letter, which has also been sent by post.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to [redacted] at <[redacted]

Best regards

[redacted]

**01.05.2018 – Consultation letter (OPS.LT.5113.AHO.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |

| | | |
|---|---|---|
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
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| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the developm of this EP.<br>• Appropriate navigation and radio equipment available on board all proje vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and rad equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential imp on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast W Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in plac and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in th unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in th event of a hydrocarbon spill. |

| | |
|---|---|
| | • Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately i the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing o garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed o onshore by a licensed Waste Management Contractor (excluding putrescibl waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], Social Responsibility Officer.

[redacted]

Yours sincerely

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**12.05.15 - Consultation letter emailed**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the

market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**06.09.2016 - Letter (OPS.LT.4589.AHO.TC) emailed and sent by post.**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.

In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:

- The field has been monitored through in-field surveys, most recently in August 2016.
- Wells are scheduled to be permanently plugged in 2018.
- The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.
- The 500 m petroleum safety zone around the field remains in place.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted] Social Responsibility Officer.

[redacted]

Yours sincerely

[redacted]

[redacted]

*Attachments:*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**07.09.2016 – Email response received**

Hi [redacted]

You have received this message because your information is important to us and we have made some changes to how we receive hydrographic information.

| | |
|---|---|
| | Please update your email contact information for the Australian Hydrographic Office:<br>Our new address is [redacted]<br>Please refer to the attached letter for more information.<br><br>Regards,<br>Hydrographic Information Management Section |
| **AMSA** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **25.09.2020 – Email received from AMSA**<br>Good afternoon [redacted]<br>Thank you for contacting the Australian Maritime Safety Authority in relation to the Woollybutt Field - Invitation to Consult.<br>The Master should notify AMSA's Joint Rescue Coordination Centre (JRCC) by e-mail to [redacted]) for promulgation of radio-navigation warnings at least 24-48 hours before operations commence. AMSA's JRCC will require the vessel details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone numbers), area of operation, requested clearance from other vessels and any other information that may contribute to safety at sea. JRCC will also need to be advised when operations start and end.<br>Contact the Australian Hydrographic Office at [redacted] no less than four working weeks before operations, with details relevant to the operations. The AHO will promulgate the appropriate Notice to Mariners (NTM), which will ensure other vessels are informed of your activities.<br>To obtain a vessel traffic plot showing Automatic Identification System (AIS) traffic data for your area of interest, please visit AMSA's spatial data gateway [redacted] portal to download digital data sets and maps. A form for requesting customised information and data is also available via the portal (fees and charges may apply).<br>Please do not hesitate to contact us if you have any further questions. Please access the following link if you would like to leave feedback on the advice provided.<br>Regards<br>[redacted]<br>AMSA |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **8.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |
| | **13.03.2019 – Email response received**<br>Thank you for providing AMSA with the opportunity to comment on ENI's planned decommissioning activities in the Woollybutt field in NW WA. AMSA notes Eni's intent to conduct plug and abandonment activities at up to seven subsea well sites and that this will involve a Light Well Intervention Vessel (LWIV), a MODU and up to three support vessels.<br>I have attached 2 vessel traffic plots of the area of interest in NW WA, with data collected between November 2018 and January 2019. These plots indicate that traffic will be encountered within the permit block WA-25-L. With heavier tanker traffic in the southern and north-eastern sections of WA-25-L. AIS data indicates that a number of tankers transit through this area, most likely on their way into and out of the ports of Ashburton and Onslow.<br>Prior and during the decommissioning activates, please have the LWIV and MODU notify AMSA's Joint Rescue Coordination Centre (JRCC) through [redacted] for promulgation of radio-navigation warnings 24-48 hours before operations commence. AMSA's JRCC will require the LWIV and MODU's details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start and end. |

| | |
|---|---|
| | The Australian Hydrographic Office must be contacted through [redacted] no less than four working weeks before operations commence for the promulgation of related notices to mariners.<br>Kind regards<br>[redacted] |
| | **09.05.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Hello [redacted]<br>Thank you for the opportunity to comment on Eni's planned decommissioning activities in the Woollybutt field. AMSA notes Eni's intent to conduct plug and abandonment activities at up to seven subsea well sites and that this will involve a MODU and up to three support vessels.<br>Please find attached two historical AIS traffic plots, with data collected between January and March 2018. These plots indicate that traffic is relatively light within the proposed operational area, with the exception of the southern region. AIS data indicates that a number of tankers transit through this area, most likely on their way into and out of the ports of Ashburton and Onslow.<br>Noting the expected time that the MODU will be on site, it is recommended that only one notice to mariners is issued by the Australian Hydrographic Office (AHO). If you are able to provide a bounding polygon of the operational area, this will minimise the requirement to frequently report for rig moves. Please contact the AHO via [redacted] no less than four working weeks before operations commence for the promulgation of notices to mariners.<br>Please have the MODU notify AMSA's Joint Rescue Coordination Centre (JRCC) through [redacted] (Phone: [redacted]) for promulgation of radio-navigation warnings at each of the plug and abandonment sites, 24-48 hours before operations commence. AMSA's JRCC will require the MODU's details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), location, requested clearance from other vessels and need to be advised when operations start and end.<br>If you have any follow up enquiries please don't hesitate to contact me.<br>Kind regards,<br>[redacted] |
| | **04.05.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Dear [redacted]<br>Eni Australia is planning the decommissioning of the Woollybutt Field and as a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached letter, which has also been sent by post.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to [redacted] or ([redacted]<br>Best regards<br>[redacted] |
| | **01.05.2018 – Letter (OPS.LT.5114.AMSA.TC) emailed and sent by post**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.<br>**Background**<br>Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia. |

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the developm of this EP.<br>• Appropriate navigation and radio equipment available on board all proje vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and rad equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential imp on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast W Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in plac and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in th unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in th event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting w cetaceans) to minimise the disturbance to marine fauna caused by vesse noise or strike which includes restrictions on vessel speeds and helicopte operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engine and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |

| | |
|---|---|
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately i the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing o garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed o onshore by a licensed Waste Management Contractor (excluding putrescibl waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**06.09.2016 - Letter (OPS.LT.4590.AMSA.TC) emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.

In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:

- The field has been monitored through in-field surveys, most recently in August 2016.
- Wells are scheduled to be permanently plugged in 2018.
- The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.
- The 500 m petroleum safety zone around the field remains in place.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted].

[redacted]

| | |
|---|---|
| | [redacted]<br><br>Yours sincerely<br>[redacted]<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m*<br>*Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **DNP** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **08.10.2020 – Response received from DNP**<br>Good afternoon [redacted]<br>Thank you for providing the Director of National Parks (DNP) with an opportunity to comment on the summary of Eni Australia Limited's revision of the Woollybutt Field Environmental Plan (EP) to allow for ongoing field management, field status and proposed plug and abandonment (P&A) and equipment recovery activities.<br>Based on the factsheet provided, we note that the planned activity does not overlap any Australian Marine Parks. We note your advice that the operational area of the Woollybutt Field is approximately 40km southwest of Montebello Marine Park. Therefore there are no authorisation requirements from the DNP. However, the DNP would like to take this opportunity to emphasise the importance of protecting Australia's marine parks now and into the future. Mining in or near marine parks poses many risks to the natural, cultural and socio-economic values of our parks. Failing to appropriately manage these risks can have catastrophic effects for generations.<br>To assist in the preparation of an EP for petroleum activities that may affect Australian marine parks, NOPSEMA has worked closely with Parks Australia to develop and publish a guidance note that outlines what titleholders need to consider and evaluate. In preparing the EP, you should consider the Australian marine parks. In the context of the management plan objectives and values, you should ensure that the EP:<br>- identifies and manages all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and has considered all options to avoid or reduce them to as low as reasonably practicable.<br>- clearly demonstrates that the activity will not be inconsistent with the management plan.<br>The *North-west Marine Parks Network Management Plan 2018* (management plan) came into effect on 1 July 2018 and provides information on values for Montebello, Gascoyne and Ningaloo Marine Parks. Further information on the values is also located on the Australian Marine Parks Science Atlas.<br>I can confirm that we do not require further notification of progress made in relation to this activity unless details regarding the activity change and result in an overlap with a marine park or new impact, or for emergency responses (see details below).<br>*Emergency responses:*<br>The DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be provided to the 24 hour Marine [redacted]. The notification should include:<br>- titleholder details<br>- time and location of the incident (including name of marine park likely to be effected)<br>- proposed response arrangements as per the Oil Pollution Emergency Plan (e.g. dispersant, containment, etc.)<br>- confirmation of providing access to relevant monitoring and evaluation reports when available; and<br>- contact details for the response coordinator.<br>Note that the DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.<br>Please don't hesitate to contact [redacted] you have any further questions.<br><br>Kind regards<br>[redacted]<br><br>[redacted] \| [redacted] |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |

**8.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**

Refer to AFMA consultation for full letter content.

**21/03/2019 – Email response received**

Good morning [redacted]

Thank you for providing the Director of National Parks (DNP) with an opportunity to comment on the summary of Eni Australia's revision of their Environmental Plan (EP) to allow for intervention and plug and abandonment activities of wells in the Woolybutt Oil Field.

As offered in your email below, if you could provide additional information on which marine parks could be impacted, once modelling is complete, that would be appreciated. We will then provide a more formal response.

Regards

[redacted] | [redacted]

[redacted]

www.parksaustralia.gov.au

**25/03/2019 – email sent**

Hi [redacted]

Thanks for your email. We have received stochastic modelling output and the following Australian Marine Parks have the potential to be contacted by crude oil in the unlikely event of a spill from a subsea loss of containment at thresholds >70ppb (entrained hydrocarbons) and/or >100ppb (dissolved hydrocarbons):

- Ningaloo: Recreational use zone
- Montebello: Multiple use zone
- Gascoyne: Habitat Protection zone and Multiple use zone

No surface hydrocarbons at concentrations above >1g/m2 are likely to contact Australian Marine Parks.

Eni is currently preparing an EP including Oil Pollution Emergency Plan for the proposed activities which will discuss potential oil spill risks and management measures to reduce the risk to an ALARP and acceptable level.

Please let me know if you required additional information to provide comments.

Best regards,

**27/03/2019 – Email response received**

Good morning [redacted]

Thank you for providing the Director of National Parks (DNP) with an opportunity to comment on the summary of Eni Australia's revision of their Environmental Plan (EP) to allow for intervention and plug and abandonment activities of wells in the Woollybutt Oil Field.

Based on the information provided, we note that the planned activity does not overlap any Australian Marine Parks. Production licence WA-25-L is located approximately 25, 90 and 110 kilometres from Montebello, Ningaloo and Gascoyne marine parks respectively. Therefore there are no authorisation requirements from the DNP. We also note that stochastic modelling demonstrates that Ningaloo, Montebello and Gascoyne marine parks may be impacted in the event of a spill. Theses marine parks are part of the North-west Marine Parks Network and further information on the park values are available in the North-west Marine Parks Network Management Plan 2018 and the Australian Marine Parks Science Atlas.

To assist in the revision of an EP for petroleum activities that may affect Australian marine parks, NOPSEMA has worked closely with Parks Australia to develop and publish a guidance note that outlines what titleholders need to consider and evaluate. In revising the EP, you should consider Australian marine parks. In the context of the management plan objectives and values, you should ensure that the revised EP:

- identifies and manages the impacts and risks on Australian marine park values to an acceptable level and has considered all options to avoid or reduce them to as low as reasonably practicable.
- clearly demonstrates that the activity will not be inconsistent with the management plan.

I can confirm that we do not require further notification of progress made in relation to this activity unless details regarding the activity change and result in an overlap with a marine park or for emergency responses (see details below).

*Emergency responses:*

| | |
|---|---|
| | The DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be provided to the [redacted]. The notification should include:<br>- titleholder details<br>- time and location of the incident (including name of marine park likely to be effected)<br>- proposed response arrangements as per the Oil Pollution Emergency Plan (e.g. dispersant, containment, etc.)<br>- confirmation of providing access to relevant monitoring and evaluation reports when available; and<br>- contact details for the response coordinator.<br>Please don't hesitate to contact [redacted] if you have any further questions.<br>Kind regards<br>[redacted] \| [redacted]<br>[redacted] |
| **DoT** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **05.10.2020 –Consultation letter received**<br>Hi [redacted]<br>Thank you for the consultation. If there are any changes to the oil spill response arrangements or change in risk, please ensure that the Department of Transport is consulted as outlined in the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020) which can be accessed here – https://www.transport.wa.gov.au/mediaFiles/marine/MAC_P_Westplan_MOP_OffshorePetroleumIndGuidance.pdf<br>Kind Regards,<br>[redacted] |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **8.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |
| | **07.08.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Good Afternoon [redacted]<br>Thanks for submitting the following documents for DoT review:<br>• 2018.05.21 Spill risk information for WA DOT.pdf<br>• Field Management PA OPEP_Rev0_draft to DOT<br>DoT has not undertaken a comprehensive review of these documents. This is partially due to the relatively lower risk of plugging and abandonment activities and the offshore location of the activity.<br>Please ensure that the OPEP is aligned with the current and any future revisions of the IGN. A brief review demonstrated that the DoT IGN was consulted in the preparation of your OPEP.<br>I also noted that in multiple locations of the OPEP, cross referencing links had broken, making it difficult to find the appropriate section. Please also check the 'MEECC' abbreviation.<br>DoT has no further comments at this time. Can you please forward the revised version of the OPEP to DoT when finalised?<br>Please feel free to contact myself [redacted] with regards to the IGN or oil spill exercises.<br>Regards<br>[redacted] |
| | **14.06.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni* |

Thanks [redacted]

We will review this and get back to you if there are any queries. Please note that responses to consultation are currently taking a little longer than normal due to the volume that has been received.

Kind Regards,
[redacted]

**24.05.2018 – Email**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Hi [redacted]

Apologies for the delay in response.

Please find attached the Spill Risk information in relation to the Woollybutt decommissioning project.

Cheers
[redacted]

**14.05.2018 – Email**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Hi [redacted]

If there is a risk of a spill impacting State waters from the proposed activities, please ensure that the Department of Transport is consulted as outlined in the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (December 2017) which can be accessed here -
https://www.transport.wa.gov.au/mediaFiles/marine/MAC_P_Westplan_MOP_OffshorePetroleumIndGuidance.pdf

Kind Regards,
[redacted]

**04.05.2018 – Email**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

To Whom it May Concern

Eni Australia is planning the decommissioning of the Woollybutt Field and as a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached letter, which has also been sent by post.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to [redacted] at [redacted]

Best regards
[redacted]

**01.05.2018 – Consultation letter (OPS.LT.5126.DOT.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013. |

| | |
|---|---|
| | • Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**DoAWE (previously DoEE)**

**18.03.21 –Sea Dumping Section response and agreement to meeting**

Hi [redacted],

Would you be available for a MS teams call Monday the 22nd 330pm AEST? My colleague [redacted] will join us.

Let me know and I'll send an invite for you.

Regards,

**17.03.21 – Eni response and request for meeting**

Dear [redacted],

Thank you for the information. I appreciate the regulatory review is ongoing and complex.

We do intend to submit sea dumping permit in the near future. I would like to have a chat to understand how we should best approach the Sea Dumping Permit application and assist the assessment process while the Department is reviewing its future permitting approach. Would you be available for a phone call later this week?

Kind regards

**16.03.21 – Feedback received from Sea Dumping Section**

Dear [redacted],

Thank you for your email in relation to the proposed abandonment of subsea infrastructure associated with the Woollybutt Field.

As you would be aware sea dumping permits are issued in accordance with the *Environment Protection (Sea Dumping) Act 1981* and the London Protocol. This legal framework is supplemented by guidance material published by the International Maritime Organisation (IMO). Guidelines are intended for use by national authorities responsible for regulating dumping of wastes to guide the evaluation of applications for

dumping of wastes in a *matter* consistent with the provisions of the London Protocol. However, the guidelines do not replace the requirements described in Annex 1 ("Wastes or other matter that may be considered for dumping") or Annex 2 ("Assessment of Wastes or other matter that may be considered for dumping") of the London Protocol.

As you may be aware, in October 2019, the *Revised specific guidelines for assessment of platforms or other man-made* structures *at sea* were approved at the Meeting of the Parties to the London Protocol and subsequently issued by the IMO. The revised guidelines provide a broadened definition of platforms, which may have implications for the department's approach to permitting of abandoned infrastructure at sea. Accordingly, the department is reviewing its regulatory arrangements for decommissioning of offshore oil and gas infrastructure, including consideration of the amendments to these guidelines, and plan to consult with industry in due course regarding potential changes to our approach. Until our position is resolved, the department will continue to consider proposals to abandon infrastructure at sea on a case-by-case basis.

As the scenarios you have presented fall within the scope of the department's review, we are unable to provide with specific advice on your proposals until we have finalised the broader permitting approach on this issue. The department is currently working to finalise this review as expeditiously as possible, however, this is a highly complex matter and I am currently unable to provide you with a definitive date at this time. If you are proposing to abandon infrastructure in situ in the near future, prior to the department's permitting approach being finalised, you should submit an application to the department utilising the following form: https://www.environment.gov.au/resource/dispose-vessels-sea.
We would be happy to further discuss this project, as it pertains to abandonment, at your convenience.

Kind regards,

**11.03.21 – Further information sent to the Sea Dumping Section and request for consultation regarding Sea Dumping Permit**

Dear Sir/Madam

We would like to consult with the Department regarding the proposed abandonment of some subsea infrastructure associated with the Woollybutt Field.

Attached is a bulletin outlining the current status of the field and proposed activities (e.g. P&A).

The structures proposed for abandonment are outlined below, and details attached.

| Structure | Qty | Description |
|---|---|---|
| Corkybark-1 wellhead | 1 | Abandoned well with temporary guide base and casing remaining |
| Mooring anchor chains | 6 | Steel |
| Mooring anchors | 6 | Steel coated with two-part epoxy. Embedded and buried beneath seabed |
| Concrete mattresses | 8 | Concrete, PVC, fibre |
| Umbilicals | ~10km total | Bend stiffener material components include: Carbon Steel, Polyurethane, Silicone Base, Aluminium (Exposed Surface coated with Two-Part Epoxy)<br>Bend restrictor material components include: stainless steel, polyurethane |
| 6-inch flowlines | ~10km total | Material components include: Carbon Steel, Polyethylene, Polypropylene, Polyurethane, Lead, Copper, PA11, Polyester, Aramid Fibre (Kevlar) |
| 4-inch flowlines | ~6km | |
| 2½-inch flowlines | ~4km | |

Could we arrange a meeting to discuss the project and the best way to approach the sea dumping permits?

Regards

[Attachments: OPS.LT.6416.SD and 2021.03.11 WBT equipment summary]

**25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**

Refer to AFMA consultation for full letter content.

**8.03.2018 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**

**Woollybutt Oil Field Operations and Plug and Abandonment Environment Plan Revision**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking field management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package outlines the ongoing field management, and proposed intervention and P&A activities of up to seven wells within the field. The Woollybutt field is currently managed under an in-force Environment Plan (EP), approved until 2022. The EP is currently being updated to include the P&A activities. Subsequent decommissioning activities of subsea equipment will be the subject of a future EP submission and is not covered by this Stakeholder Consultation Package.

Consultation material provided in 2015, 2016 and 2018 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. The consultation material provided below provides an update to the ongoing field management and P&A activities proposed.

**Activity Location**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia **(Figure 1).**

Coordinates of the confirmed and additional wells subject to P&A activities are detailed in **Table 1.** A petroleum safety zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the Mobile Offshore Drilling Unit (MODU) and wells during the P&A activities **(Figure 2).**

Table 1: Well coordinates

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Activities**

The activity involves the field management and P&A of four shut-in production wells and up to three additional abandoned well (all within WA-25) as detailed above, within the Woollybutt Field.

Field management comprises of:

- Annual ROV surveys prior to P&A activities, lasting for a duration of 3-7 days, utilising one project vessel;
- ROV surveys every "'2 years after P&A, until decommissioning, lasting for a duration of 3-7 days, utilising one project vessel.

P&A activities comprise of two campaigns:

- Mobilisation of a Light Well Intervention Vessel (LWIV) to set plugs and cement barriers at specified depths within WB-4 and possibly also WB-1 well. The LWIV will be on location for up to 10 days per well, P&A activity on WB-4 and WB-1 may occur post

intervention using the LWIV, providing the intervention schedule allows. Otherwise these wells will be included in the MODU P&A, detailed below;

- Mobilisation of a MODU and up to three support vessels to plug the remaining wells (and WB-4 and WB-1, In the event they are not P&A post intervention using the LWIV). A MODU and up to three support vessels will be on location at each well for up to 20-30 days.

**Timing and vessel details**

The intervention of the WB4 well and possibly WB-1, prior to P&A activities is anticipated to be undertaken in Q4 2019.

For the P&A activities, Eni anticipates that the program will commence in 2021, the MODU and up to 3 support vessels will be on location at each well for up to 20-30 days and the entire program will be completed within 150 days.

Further detail can be communicated to relevant stakeholders and Government maritime agencies prior to commencement

**Environmental Management**

Eni has undertaken a risk assessment for the ongoing field management and the proposed P&A program. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

Table 2: Environmental management

| **Potential risks and/or impacts** | **Mitigation and/or Management Measure** |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells during P&A.<br>• Eni will notify relevant stakeholders and Government maritime safety agencies of specific start and end dates of the P&A activities, which will include specific vessel-on-<br>• location dates and any exclusion zones prior to commencement of the activities. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• MODU anchored to prevent drifting *off* location during P&A<br>• All vessels will have a SOPEP that will be implemented<br>• immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2.** |

| | |
|---|---|
| Marine fauna interactions due to:<br>Vessel collision,noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an inspection, maintenance and repair program<br>• operating to ensure engines and equipment are kept In good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention-air pollution) 2013. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention-oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention-garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention-sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

**Stakeholder comment and feedback**

Your comment is sought in relation to any potential impact that the ongoing field management and the proposed P&A activities may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 4 April 2019 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted]

Email: [redacted]

Post: [redacted]

**18 December 2014**

**Meeting: Cth Dept of the Environment – Post Approvals – Streamlining and Outcomes Based Conditions**

ENI PARTICIPANTS: [redacted]

PUBLIC AUTHORITY PARTICIPANTS: [redacted]

**Purpose(s) of Meeting:**

*To discuss the streamlining of Environmental Protection and Biodiversity Conservation (EPBC) Act approval conditions. Specifically:*

- *Woollybutt EPBC approval 18 February 2002*
- *Blacktip Gas Field Devleopment, WA and NT (EPBC 2003/1180)*

| | |
|---|---|
| | **Key Points of Fact from Meeting:**<br>  |
| | **06.09.2016 - Letter (OPS.LT.4596.DOTE.TC) emailed and sent by post**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed to [redacted].<br>Email: [redacted]<br>Post: [redacted]<br>Phone: [redacted]<br>Yours sincerely<br>[redacted]<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **DOD** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |

**8.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**

Refer to AFMA consultation for full letter content.

**29.05.2018 – Email**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

UNCLASSIFIED

Good Morning,

Defence has reviewed the information provided and has no objections to the proposed decommissioning of the Woollybutt Oil Field.

Please ensure continued liaison with the Australian Hydrographic Service (AHS), in particular ensure that the AHS is notified three weeks prior to the actual commencement of activities. This information is critical to maritime safety, and reduces negative impacts on other maritime users. The AHS can be contacted directly through the Nautical Assessment officer, [redacted], on ([redacted] and/or at the address listed on the website, http://www.hydro.gov.au/aboutus/contact.htm.

Please contact me if you have any further queries.

Kind Regards,
[redacted]

**04.05.2018 – Email**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Dear [redacted]

Eni Australia is planning the decommissioning of the Woollybutt Field and as a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached letter, which has also been sent by post.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to [redacted]

Best regards
[redacted]

**01.05.2018 Consultation letter (OPS.LT.5118.DOD.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the developmer of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and rad o equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impact on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Wate Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately i the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing o garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed o onshore by a licensed Waste Management Contractor (excluding putrescibl waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**12.05.15 - Consultation letter sent**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**21.07.15 - Updated consultation letter emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a

radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**06.08.15 - Reply received via email**

*UNCLASSIFIED*

Good Morning,

Defence has reviewed the update to the Woollybutt decommissioning project and has no objection.

Kind Regards,

[redacted] | [redacted]

Property Acquisition, Mining & Native Title | Property Management

Infrastructure Division | Estate & Infrastructure Group

Department of Defence

**06.09.2016 - Letter (OPS.LT.4594.DOD.TC) emailed and sent by post.**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.

In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:

- The field has been monitored through in-field surveys, most recently in August 2016.
- Wells are scheduled to be permanently plugged in 2018.
- The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.
- The 500 m petroleum safety zone around the field remains in place.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

[redacted]

| | |
|---|---|
| | [redacted]<br>Yours sincerely<br>[redacted]<br>Deputy Operations Manager<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **DMIRS (Formerly DMP)** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **09.10.2020 – Email response from DMIRS**<br>Afternoon [redacted]<br>The Department of Mines, Industry Regulation and Safety (DMIRS) acknowledges receipt of the information sent by [redacted] on behalf of Eni Australia Limited on 25 September 2020 relating to ongoing field management, subsea equipment recovery and P&A activities, to be conducted in Commonwealth waters Production Licence WA-25-L).<br>DMIRS notes that the proposed activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and regulated by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).<br>DMIRS has reviewed the notification and does not require any further information at this stage. Please provide pre-start notifications confirming the start date of the proposed P&A and subsea equipment recovery executions, and subsequent cessation notifications to inform DMP upon completion of the activity, to [redacted]<br>Please refer to the Consultation Guidance Note for information pertaining to the reporting of incidents that could potentially impact on any land or water under State jurisdiction.<br>Feel free to contact me if you have any queries.<br>Best regards,<br>[redacted] \| [redacted] |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **04.04.19 - Reply received via email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Hi [redacted]<br>Thanks for the attached information.<br>Please can you provide the updated spill modelling referred to in the correspondence, or a summary that is relevant to State waters/lands.<br>Please can you also confirm that the revised EP includes incident notification and reporting arrangements for events with the potential to impact values within State waters/lands?<br>Please feel free to give me a call if you have any queries.<br>Regards<br>[redacted]<br>[redacted] \| [redacted] \| Resource and Environmental Compliance Division<br>**Department of Mines, Industry Regulation and Safety**<br>**Tel:** [redacted] |
| | **8.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**<br>**Woollybutt Oil Field Operations and Plug and Abandonment Environment Plan Revision**<br>Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking field management activities within the Woollybutt Field, located off the North-West coast of Western Australia.<br>From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.<br>This Stakeholder Consultation Package outlines the ongoing field management, and proposed intervention and P&A activities of up to seven wells within the field. The Woollybutt field is currently |

managed under an in-force Environment Plan (EP), approved until 2022. The EP is currently being updated to include the P&A activities. Subsequent decommissioning activities of subsea equipment will be the subject of a future EP submission and is not covered by this Stakeholder Consultation Package.

Consultation material provided in 2015, 2016 and 2018 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. The consultation material provided below provides an update to the ongoing field management and P&A activities proposed.

**Activity Location**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia **(Figure 1).**

Coordinates of the confirmed and additional wells subject to P&A activities are detailed in **Table 1.** A petroleum safety zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the Mobile Offshore Drilling Unit (MODU) and wells during the P&A activities **(Figure 2).**

Table 1: Well coordinates

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Activities**

The activity involves the field management and P&A of four shut-in production wells and up to three additional abandoned well (all within WA-25) as detailed above, within the Woollybutt Field.

Field management comprises of:

- Annual ROV surveys prior to P&A activities, lasting for a duration of 3-7 days, utilising one project vessel;
- ROV surveys every "'2 years after P&A, until decommissioning, lasting for a duration of 3-7 days, utilising one project vessel.

P&A activities comprise of two campaigns:

- Mobilisation of a Light Well Intervention Vessel (LWIV) to set plugs and cement barriers at specified depths within WB-4 and possibly also WB-1 well. The LWIV will be on location for up to 10 days per well, P&A activity on WB-4 and WB-1 may occur post intervention using the LWIV, providing the intervention schedule allows. Otherwise these wells will be included in the MODU P&A, detailed below;
- Mobilisation of a MODU and up to three support vessels to plug the remaining wells (and WB-4 and WB-1, In the event they are not P&A post intervention using the LWIV). A MODU and up to three support vessels will be on location at each well for up to 20-30 days.

**Timing and vessel details**

The intervention of the WB4 well and possibly WB-1, prior to P&A activities is anticipated to be undertaken in Q4 2019.

For the P&A activities, Eni anticipates that the program will commence in 2021, the MODU and up to 3 support vessels will be on location at each well for up to 20-30 days and the entire program will be completed within 150 days.

Further detail can be communicated to relevant stakeholders and Government maritime agencies prior to commencement

**Environmental Management**

Eni has undertaken a risk assessment for the ongoing field management and the proposed P&A program. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

Table 2: Environmental management

| **Potential risks and/or impacts** | **Mitigation and/or Management Measure** |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells during P&A.<br>• Eni will notify relevant stakeholders and Government maritime safety agencies of specific start and end dates of the P&A activities, which will include specific vessel-on-<br>• location dates and any exclusion zones prior to commencement of the activities. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• MODU anchored to prevent drifting *off* location during P&A<br>• All vessels will have a SOPEP that will be implemented<br>• immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2.** |
| Marine fauna interactions due to:<br>Vessel collision,noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an inspection, maintenance and repair program<br>• operating to ensure engines and equipment are kept In good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention-air pollution) 2013. |

| | |
|---|---|
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention-oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention-garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention-sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

**Stakeholder comment and feedback**

Your comment is sought in relation to any potential impact that the ongoing field management and the proposed P&A activities may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 4 April 2019 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted].

Email: [redacted]

Post: [redacted]

Deputy Operations Manager

**08.06.2018 – Email**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Hi [redacted]

Thank you for providing the information on existing environment and spill modelling.

DMIRS notes that there was no mention of state incident reporting, however also notes ENI spill modelling predicts no contact during any season to State Marine Protected Areas. Please ensure that the environment plan contains incident notification to DMIRS, as per Section 2.4 of the Consultation Guidance Note.

Please submit future activity notifications to the Petroleum Environment Branch email address: [redacted]

If you have any queries regarding the above, please don't hesitate to contact me.

Kind regards

[redacted]

**07.06.2018 – Email**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Hi [redacted]

Thank you for your response regarding the Woollybutt Decommissioning Project.

| | |
|---|---|
| | Please find attached the information requested regarding the receiving environment as well as spill risk information.<br>Should you have any queries, please do not hesitate to contact me.<br>Kind Regards<br>[redacted] |
| | **30.05.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Hi [redacted]<br>The Department of Mines, Industry Regulation and Safety (DMIRS) acknowledges receipt of the information sent by ENI Australia on 4 May 2018 relating to the decommissioning of the Woollybutt Field to be conducted in Commonwealth waters WA-25 L.<br>DMIRS notes the proposed activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and regulated by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).<br>The information does not currently provide DMIRS with sufficient information regarding the description of the receiving environment, and potential impacts to State waters and lands. Please see the Consultation Guidance Note for DMIRS requested level of information for activities being undertaken offshore from Western Australia. ENI Australia should consider whether the proposed activity has potential to impact on values in State waters or lands, and subsequently provide further information in accordance with s2.1.1, s.2.12 or s2.1.3 of the Consultation Guidance Note as appropriate.<br>If you have any queries regarding the above, please don't hesitate to contact me.<br>Kind regards<br>[redacted] |
| | **04.05.2018 – Email**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Dear [redacted]<br>Eni Australia is planning the decommissioning of the Woollybutt Field and as a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached letter, which has also been sent by post.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to [redacted], [redacted] at <[redacted]<br>Best regards<br>[redacted]<br>[redacted] |
| | **01.05.2018 – Consultation Letter (OPS.LT.5117.DMIRS.TC)**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.<br>**Background**<br>Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.<br>From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.<br>This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022. |

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the developm of this EP.<br>• Appropriate navigation and radio equipment available on board all proje vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and rad equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential imp on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast W Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in plac and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in th unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in th event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting w cetaceans) to minimise the disturbance to marine fauna caused by vesse noise or strike which includes restrictions on vessel speeds and helicopte operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engine and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 9 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediatel the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013. |

| | |
|---|---|
| | • Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing o garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed o onshore by a licensed Waste Management Contractor (excluding putrescibl waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted]

[redacted]

[redacted]

[redacted]

Yours sincerely

[redacted]

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**06.09.2016 - Letter (OPS.LT.4593.DMP.TC) emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.

In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:

- The field has been monitored through in-field surveys, most recently in August 2016.
- Wells are scheduled to be permanently plugged in 2018.
- The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.
- The 500 m petroleum safety zone around the field remains in place.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

[redacted]

[redacted]

Yours sincerely

[redacted]

[redacted]

*Attachments:*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

| | |
|---|---|
| **DBCA (formerly DPaW)** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **02.10.2020 – Email response received from DBCA**<br>Good morning [redacted]<br>Thank you for providing the Department of Biodiversity, Conservation and Attractions (DBCA) with the attached information in relation to Eni Australia Limited's field maintenance / decommissioning activities within WA-25-L in Commonwealth waters. DBCA has undertaken a review of the documentation provided and other readily available information, and provides the following comments in relation to its responsibilities under the Conservation and Land Management Act 1984 and Biodiversity Conservation Act 2016.<br>There are a number of ecologically important areas including marine parks and island/coastal conservation reserves located in the vicinity of the proposed operations, including the Barrow Island Marine Park. Based on the information provided it appears that there is potential for these areas to be affected by Eni's operations if there is a substantial hydrocarbon release and subject to particular weather or other environmental conditions. Given the ecological importance of areas potentially affected by a hydrocarbon release, it is considered important that the baseline values and state of the potentially affected environment are appropriately understood and documented prior to any activities that pose a risk of impacting these areas.<br>DBCA would like to have confidence that Eni maintains appropriate baseline survey data on the important ecological values of these areas and any current contamination if present within the area of potential impact of spills (as identified through Eni's modelling). In addition to a desktop review and risk assessment, Eni should also maintain appropriate baseline abundance and distribution data for any threatened and specially protected marine fauna species in the area of potential impact, including information on the key habitats these species use for activities like foraging, breeding and aggregating. If baseline information is not available, Eni should thoroughly assess what baseline information is required commensurate with the level of risk associated with the activities, and identify suitable sources/methods to attain that information such that Eni can ensure that any impacts on ecological values and recovery of these values can be monitored and remediated.<br>DBCA undertakes monitoring in marine parks and reserves and publishes monitoring reports which are available on the department's website. However, Eni should be aware that this monitoring is targeted to inform DBCA's values and objectives relating to marine park management and is not necessarily suitable to provide all baseline information required for oil spill risk assessment and management planning. DBCA encourages Eni to ensure it attains all information required to implement a Before-After, Control-Impact (BACI) framework in planning its management response. This may include independently monitoring and collecting data where required or identifying other data sources.<br>In developing its Environmental Plan, DBCA also recommends that Eni refer to the Commonwealth Department of Agriculture, Water and the Environment's National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds as a best-practice industry standard for managing potential impacts of light pollution on marine fauna (https://www.environment.gov.au/biodiversity/publications/national-light-pollution-guidelines-wildlife).<br>INCIDENTS AND EMERGENCY RESPONSE<br>In the event of a hydrocarbon release, it is requested that Eni notify DBCA's Pilbara regional office as soon as practicable on [redacted]. Note however, that DBCA will not implement an oiled wildlife management response on behalf of a petroleum operator except as part of a whole of government response mandated by regulatory decision makers, and any advice or assistance from DBCA, at any scale, will occur on a full cost recovery basis. Eni should also commit to the monitoring and clean-up of any DBCA interests affected by an oil spill in consultation with DBCA.<br>Eni should refer to the Department of Transport's (DoT) guidance regarding marine pollution (https://www.transport.wa.gov.au/imarine/marine-pollution.asp), and the Offshore Petroleum Industry Guidance Note dated July 2020 titled Marine Oil Pollution: Response and Consultation Arrangements. These documents provide information on the Western Australian emergency management arrangements for marine oil pollution incidents in State waters, petroleum titleholders' obligations under those arrangements, and the DoT's expectations as the jurisdictional authority for such incidences.<br>If you wish to discuss or seek clarification of the above advice, please do not hesitate to contact me.<br>Please provide all future notifications to [redacted] |

| | |
|---|---|
| | [redacted] |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **8.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |

**01.05.2018 – Consultation letter sent (OPS.LT.5116.DBCA.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
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- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
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| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

| | |
|---|---|
| | **06.09.2016 - Letter (OPS.LT.4605.DPAW.TC) emailed and sent by post**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed to [redacted], [redacted].<br>[redacted]<br>Yours sincerely<br>[redacted]<br>Deputy Operations Manager<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **DPIRD (formerly DOF)** | **17.05.2021 – Follow up email sent to DPIRD following meeting on 11.05.2021**<br>Hi [redacted]<br>Thanks for catching up with Advisian and Eni last Tuesday (11 May) to discuss the Woollybutt Decommissioning Environment Plan.<br>As discussed, we have two points that we would like input from DPIRD on:<br>1. **Zone 1 of the Pilbara Trawl Fishery**: Other stakeholders have raised concerns about the potential for snag risks from the infrastructure that is proposed to be left in situ. As the area is currently in Zone 1 of the Pilbara Trawl Fishery it is currently closed to trawling and there are no short term snag impacts. However, we need to understand the potential for this area to be re-opened to trawlers in the future so that we can provide an assessment of the medium and long term snag risks. It would be useful if DPIRD could provide us with information on the likelihood of this area re-opening, or if that is not possible any other information such as the process for reopening a trawl area and reasons why the trawl area is currently closed would be useful. Furthermore, any information you can provide on the size of trawl equipment may be useful in helping us to determine what controls may be most appropriate for Eni to consider.<br>Eni are also considering controls to mitigate the potential snag risk, these include rock dumping or installation of over-trawlable structures and marking infrastructure of nautical charges with a 500m exclusion zone. Can you please provide any comments or advice that DPIRD may have on these potential controls?<br>2. **DPIRD comments on the Proposal**: We provided DPIRD with consultation material in March and have not received feedback, if you do have feedback would you mind sending this through so that we can incorporate it into the EP, and work with DPIRD to close out any outstanding comments?<br>Thanks<br>[redacted] |

**11.05.2021 – Meeting between DPIRD Fisheries and Eni**

Discussion points:

- Zone 1 of the Pilbara trawl Fishery – DPIRD view is that the snag risk of wellheads is typically low based on the ongoing presence of the infrastructure on the seabed and technology used on trawl vessels for detecting and avoiding seabed obstacles. DPIRD prefer equipment to be marked on nautical charts and avoided by trawl vessels, rather than the use of over-trawlable structures, which could be subject to corrosion, movement and scouring. DPIRD confirmed a number of changes would be required for Pilbara Trawl Fishery Zone 1 to reopen, including amendment to the fishery management plan.
- DPIRD comments on the decommissioning proposal – DPIRD will provide a formal response

Actions:

- DPIRD Fisheries to provide formal response to decommissioning proposal
- DPIRD Fisheries to seek clarifications regarding the trawl area and potential for Zone 1 to reopen.

**24.03.2021 –Follow up email sent**

Hi [redacted]

Further to my email dated 10 March 2021 Eni have updated their decommissioning strategy and would like to inform you of one additional piece of infrastructure that is proposed to be decommissioned in situ, the Corkybark wellhead.

The Corkybark well is an abandoned exploration well, located within the Woollybutt field at the following coordinates:

| Eastings | Northings | Longitude | Latitude |
|---|---|---|---|
| 289233 | 7688393 | 114.9736806 | -20.8928668 |

The figure showing the location of the Woollybutt field is attached.

In 2000 Eni attempted to remove the wellhead, however due to technical and safety issues the wellhead could not be completely removed. The portion of the wellhead that was unable to be removed remains on the seabed, extending up to 1.3m in height. The wellhead is comprised entirely of steel and does not contain any operational fluids or plastics. A photo showing the Corkybark wellhead is also attached.

As part of Eni's strategy for decommissioning the Woollybutt field, they are seeking approval from NOPSEMA to leave Corkybark wellhead in situ. The potential impacts from this are detailed in the table below:

| Environmental Risk and/or Impact | Risk Description |
|---|---|
| Interaction with other marine users | Leaving the Corkybark wellhead in situ will result in a long term physical presence on the seabed. This has potential to interact with other marine users, particularly those who have activities that also interact with the seabed.<br>These potential impacts will be assessed in the EP and will include mitigation measures such as long term identification of infrastructure on marine charts. |
| Discharge of material to the marine environment | Long term degradation of the Corkybark wellhead may occur.<br>As the wellhead corrodes and degrades the constituents making up the wellhead will be released to the environment. Iron, the main consistent of wellheads (about 98%) is not considered a significant contaminate in the marine environment. Other constituents represent less than 2% of the wellhead's composition and impacts to marine environment from these is extremely low.<br>Degradation modelling of the wellhead has shown that it could take up to 250 years to corrode.<br>The EP will assess the potential impacts to the marine environment from the breakdown of materials. |
| Benefits to benthic habitats | Observations of the Woollybutt infrastructure indicate that benthic habitat has become established. This is expected to provide ongoing benefits to benthic habitats in the Woollybutt field area. |

| | |
|---|---|
| | Fish habitat studies are underway to quantify the benefit that the long term presence of the subsea infrastructure may have on benthic habitats and an assessment of this will be provided in the EP. |

Eni are now also seeking your feedback on the Corkybark wellhead being left in situ in addition to the infrastructure already communicated in previous correspondence, being:

- DSPM anchors and chains
- Umbilicals and umbilical jumpers
- Flexible and reinjection flowlines and jumpers
- Umbilical crossing mattresses

Our original correspondence sought feedback by the 31st March 2021, however we have now extended this to the 16th April 2021 to allow for this additional information to be considered.

Thanks

[redacted]

**10.03.2021 –Consultation email sent**

Refer to AFMA consultation for full letter content.

**25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**

Refer to AFMA consultation for full letter content.

**11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5426.STKH.TC**)**

Refer to AFMA consultation for full letter content.

**18.03.2019 – Follow up email sent**

Dear [redacted]

I am just getting back to you on the below email sent on behalf of ENI following similar consultation undertaken with WAFIC which has requested that individual fisheries permit holders be notified of the proposed activities. ENI is seeking the latest contact details of individual license holders for the following fisheries that have a potential to be impacted by the proposed activities:

- Onslow Prawn Fishery
- Pilbara Trap Fishery
- Pilbara Line Fishery
- Pilbara Trawl Fishery
- Mackerel Managed Fishery (Licenses split by areas/zones)
- Specimen Shell Managed Fishery

Your advice on whether any additional fisheries license holders need to be consulted and/or whether any of the above need to be consulted would be greatly appreciated (e.g. it is understood that some licenses allow for the use of ROVs up to depth of 300m for the Specimen Shell Managed Fishery but we are unsure on whether there would be any activity within the planned activity area).

I await your feedback on the process that we need to go through to obtain contact details.

Best regards,

[redacted]

**26.03.2019 – Email response received**

[redacted]

Thank you for the information you sent on the 11 March 2019 regarding the Woollybutt Oil Field Decommissioning Project.

**Consultation with relevant persons**

The Department of Primary Industries and Regional Development (Department) requests that Eni consults the following representative bodies, if applicable to your proposed activities:

- Western Australian Fishing Industry Council (WAFIC);
- Pearl Producers Association of WA;
- Recfishwest; and
- Relevant Traditional Owner groups.

The Department also requests that individual commercial fishers with an entitlement to fish in the affected area are consulted. Individual commercial fisher details can be obtained through the Department's public

register - Application for a copy of an entry in, or extract from the register http://www.fish.wa.gov.au/Documents/commercial_fishing/r-1_application.pdf - please feel free to contact [redacted]

To determine the relevant fisheries and understand the fish stocks in the proposed area, the Departments spatial data is available on at data.wa.gov.au which is central portal for WA government data, the fisheries information is available at https://catalogue.data.wa.gov.au/dataset?q=fisheries+guide. This list can then be further analysed by obtaining Fishcube data, which will verify the active fisheries and species present in the area of operation or refer the Departments State of the Fisheries report - http://www.fish.wa.gov.au/About-Us/Publications/Pages/State-of-the-Fisheries-report.aspx

Fishcube data can be requested through [redacted] Surveys, Assessments and Data Analyses (SADA) Sustainability and Biosecurity.

When requesting data you will need to provide some parameters, these may include: Please note only non-confidential fishing data will be released.

- Time period – financial or calendar years, number of years of data
- Catch – species type, estimated total weight
- Effort – number of active boats
- Fishery – e.g. Pilbara Line, Trap, Trawl
- Block locations – 60 x 60nm or 10nm x 10nm – these blocks are available via our online spatial catalogue (as above)

Please feel free to contact me if you require any additional information.

Kind regards

[redacted]

[redacted] | [redacted]

Strategy and Aquatic Resource Division, Fisheries

Sustainability and Biosecurity

Department of Primary Industries and Regional Development

[redacted]

**01.05.2018 – Consultation letter sent (OPS.LT.5112.AFMA.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |

| | | |
|---|---|---|
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013. |

| | |
|---|---|
| | • Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Deputy Operations Manager

Attachments:

6. Figure 1: Location of WA-25 L with depths

Figure 2: Woollybutt Field – 500m Exclusion Zone

**01.05.2018 – Consultation Letter (OPS.LT.5119.DOF.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
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**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
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| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013. |

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| | • Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**12.05.15 - Consultation letter sent**

Dear [redacted]

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

1. The flowlines will be disconnected from the subsea trees.
2. *Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*
3. The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.
4. All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Woollybutt Field – Coordinates of the Licence Area WA-25-L

Woollybutt Field – 500m Exclusion Zone

Woollybutt Field – Location WA-25 L with Depths

Woollybutt Field – Seabed infrastructure outline

**21.07.15 - Updated consultation letter emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**27.07.15 - Reply received via email**

Dear [redacted]

*Eni Australia Limited - Woollybutt Oil Field Decommissioning Project*

Thank you for your request for comment dated 12 June 2015 on the proposed decommissioning of the Woollybutt Oil Field in permit area WA-25-L. The Department of Fisheries (Department) considers itself a 'relevant person' for the proposed activity. We understand that decommissioning activities relate to subsea infrastructure within the Woollybutt Oil Field, and are scheduled to commence in 2017.

- Fishing activities in the area

The following commercial fishing interests exist in, or in close proximity to, the areas associated with the proposed activity:

| **Permit area** | **Bioregion and province** | **Commercial fishing interests** |
|---|---|---|
| WA-25-L | North Coast, North West Shelf Province | Mackerel Managed Fishery;<br>West Coast Deep Sea<br>Crustacean Managed Fishery; Pearl Oyster Managed Fishery; Marine Aquarium Managed Fishery; Specimen Shell Fishery; Beche de Mer; Onslow<br>Prawn Managed Fishery;<br>Pilbara Trawl Managed Fishery; Pilbara Line Fishery; Pilbara Trap Managed Fishery |

Customary, recreational and charter fishing may also occur within the proposed area. To ensure affected fishers are consulted prior to the proposed activity, the Department recommends that Eni Australia Ltd initiate and maintain ongoing consultation with the Western Australian Fishing Industry Council (WAFIC), Recfishwest, and directly with individual commercial fishers (contact details of licensed fishers can be obtained through the Department's public register). In each case, consultation should include specific start and end dates of activity, and the spatial extent of the proposed activities (including any exclusion zones).

- Pollution emergency plans

In the event of an oil spill or discharge of any other pollutant into the environment, the Department requests that its spill response officer is contacted by phone ([redacted]) and by email ([redacted]) within 24 hours of Eni Australia Ltd reporting the incident to the appropriate authority. When developing the Pollution Emergency Plans (PEPs), the Department requests that Eni Australia Ltd collects baseline marine data to compare against any post-spill monitoring to determine the nature and extent of any impacts. This data should be made available to the Department upon request. For further guidance, please see the Operational and Scientific Monitoring Programs Advice Statement produced by the National Offshore Petroleum Safety and Environmental Management Authority. Spawning grounds and nursery areas for key fish species are particularly vulnerable to the impacts of spills. The Department therefore requests that specific strategies are developed in the Environment Plan (EP) and/or PEPs to mitigate these risks.

Our data indicates that the following key fish species may be spawning within the

proposed area of activities:

| **Bioregion** | **Key fish species within zone** | **Spawning aggregation times** |
|---|---|---|
| | Blacktip shark *(Carcharhinus tilstoni & C. limbatus)* | Nov- Dec |

| | | |
|---|---|---|
| North Coast | Goldband snapper *(Pristipomoides multidens)* | Jan – April |
| | Rankin cod *(Eoineohelus multiinotatus)* | Aug – October |
| | Red emporer *(Lutianus sebae)* | Jan, March |
| | Pink snapper *(Pagrus auratus) rare* | May – July |
| | Sandbar shark *(Carcharhinus olumbeus)* | Oct – Jan |
| | Spanish mackerel *(Scomberomorus commerson)* | Aug - Nov |

- Subsea Infrastructure

Eni Australia Ltd proposes to leave a number of items on the sea floor. The Department requests that any infrastructure currently buried beneath the sea floor remains in place, and that due process under the Environment Protection (Sea Dumping) Act 1981 is followed. Similarly, we request that infrastructure sitting above the sea bed is removed because of the possible individual and cumulative environmental impacts (erosion, turbidity), and because it is a potential snagging risk for fishing gear.

With this in mind we provide the following comment:

1) Flowlines, Umblicals, Mid-Depth Gravity Bases (MDGBs) & Mooring chains - this subsea equipment is not completely buried, as such (and in line with the above position), the Department does not approve of the proposal to leave this infrastructure in situ;

2) Anchors - Eni Australia Ltd has advised that these are completely buried. The Department therefore approves the proposal to leave in situ.

Notwithstanding this position, the Department is willing to consider elements of Eni Australia Ltd's proposal further should adequate justification be provided.

- Biosecurity

The Department recommends you use its new biofouling risk assessment tool Vessel Check (https://vesselcheck.fish.wa.gov.au) and complete recommended management actions to manage any activity related vessels to a LOW I ACCEPTABLE risk rating. This will also demonstrate that Eni Australia Ltd has taken reasonable measures to minimise the chance of committing offences under the Fish Resources Management Act 1994 and associated regulations related to transferring live non-endemic or noxious fish into WA. Alternatively, so Eni Australia Ltd can demonstrate the above, the Department recommends the active use of a biofouling management plan and record book that meet all requirements under Appendix 2 of the current edition of the International Maritime Organisation's Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species. The Department requests that the suspected or confirmed presence of any marine pest or disease be reported within 24 hours by email ([redacted])

or telephone ([redacted]). This includes any organism listed in the Western Australian Prevention List for Introduced Marine Pests (see: http://www.fish.wa.gov.au/Documents/biosecurity/epa introduced marine pests.pdf), and any other non-endemic organism that demonstrates invasive characteristics. Please ensure this information is forwarded directly to all vessel operators associated with the project.

- Expectation/Implementation

The Department requests that all potential impacts to fisheries, fish and fish habitats described in this letter are specifically identified in the final EP and the PEPs, and strategies to be undertaken by Eni Australia Ltd to mitigate or minimise these impacts are described.

The Department also requests that Eni Australia Ltd provides a written response to this advice addressing all the issues raised in this letter. Please contact [redacted] should you have any queries regarding the above advice.

**13.08.15 - Eni response to DoF**

Dear [redacted]

*Woollybutt Oil Field Decommissioning Project*

Thank you for your reply (Reference 522/12, dated 27 July 2105) to our consultation letter

(OPS.LT.3874.DOF.RR, 16 July 2015) on the plan for decommissioning of the Woollybutt Field. Please find below responses to each of the issues raised.

1. Fishing Activities in the area

The commercial fishing interests in the area have been noted. Consultation is ongoing with

WAFIC and Recfishwest. Consultation with individual commercial fishers is ongoing.

2. Pollution Emergency Plans

| | |
|---|---|
| | Notification request for any oil spill or discharges of any other pollutant is noted, as are the spawning aggregation times for key fish species. Baseline marine data specific to the<br>Woollybutt field was collected during a survey in 2014. Regional data is available through<br>I-GEMS, an industry and government collaboration to collate and present geospatial<br>metadata on marine environmental baseline and monitoring studies collected in the last decade. I-GEM metadata are publically accessible on wa.aodn.org.au/waodn through in<br>kind contribution of several organisations, including: APPEA, WAMSI, IVEC, IMOS, AIMS and<br>Woodside.<br><br>3. Subsea Infrastructure<br>The Department requests that:<br>• Infrastructure buried beneath the seafloor remain in place;<br>• Infrastructure sitting above the seabed be removed, including the flowlines, umbilicals, chains, mid depth buoy gravity bases (MDBGB), horizontal Xmas trees and well protrusions.<br><br>Below we provide further justification for the decision to leave subsea infrastructure in-situ.<br><br>In August last year, Eni undertook a visual Remote Operated Vehicle (ROV) survey of the infrastructure and confirmed that the flowlines, umbilicals, mooring chains and mid depth buoy gravity bases to be either completely buried (>50%) or substantially buried in the seabed. Moreover, a geophysical survey undertaken in 20013 showed surficial seafloor sediments to vary between 0.9 and 5.1 m with approximately 85% of the area having a thickness of <4 m. This layer was interpreted as comprising soft to very soft silts and fine sand, which are easily disturbed. The underlying layer was interpreted as comprising variably cemented sands or calcarenite. Given the nature of the surficial, seabed sediment<br>Eni expects that the substantially buried items to become completely buried over time.<br><br>Whilst the horizontal Xmas Trees and well protrusions and are not buried, visual observations from the ROV survey found that these structures, after 10 years in the field, have formed artificial reef structures supporting marine life in what is otherwise a featureless and barren seabed. A growing body of scientific research now supports the leave in situ option because of the role that submerged structures can play as artificial reefs. They may also contribute to connectivity conservation by providing a biodiversity corridor between discrete marine ecosystems. In the case of Woollybutt, the infrastructure could provide connectivity with the recognised key ecological feature of the Continental Slope Demersal Fish Communities offshore from Woollybutt.<br><br>The well structures, MDBGBs and chains are made from high quality steel and concrete<br>(MDGBs), both of which are inert materials, stable in the marine environment and do not present any tangible risk of contamination of the water column or marine sediments.<br>Testament to this is the well-established endorsement by the Commonwealth Department of the Environment that concrete and steel are not only inherently suitable for sea dumping or abandonment, but also as the materials of choice for artificial reefs and fish aggregation devices. Examples include the Pilbara Iron artificial reef at Dampier, WA, and the Cochrane<br>Artificial Reef near Bundaberg, Queensland, with the WA Government currently progressing plans for a number of steel and concrete artificial reefs off the south west coast.<br><br>The flowlines and umbilicals are fabricated from very stable, non- biodegradable materials<br>(high grade polyamide nylon and stainless steel) and are expected to retain their general integrity for hundreds of years.<br><br>Eni recognises the Department's concern of individual and cumulative impacts and the potential for snagging risk for fishing gear. During the recent visual survey there was no evidence of erosion or turbidity being an issue. In fact, as evidenced by the burial of the<br>flowlines, deposition of sediment is more likely. With regards to the snag risk for fishing gear, Eni is in the process of consultation with individual license holders through WAFIC to better understand this risk. Eni understands that the region is presently closed to trawling.<br>Risk for snagging shall be mitigated by marking the infrastructure on Nautical Maps for avoidance with trawl gear. It is likely that recreational fishers would target the area because of the habitat formed by the subsea structures.<br><br>Finally, other key decision criteria we examined in a Best Practicable Environmental Option assessment, such as safety and increased effort leading to enhanced greenhouse gas emissions, support the leave in situ option. Based on this assessment, Eni is of the opinion that the best practicable option for the subsea infrastructure is to leave in-situ.<br><br>*4. Biosecurity* |

Your recommendation for using the biofouling risk assessment tool and request for reporting any suspected or confirmed presence of marine pests or disease are noted.

*5. Expectation/Implementation*

The Department's request that all potential impacts to fisheries, fish and fish habitats be identified in the final EP and the OPEPs. Eni is of the opinion that the leave in situ opinion would be positive for fish and fish habitats. The main threat identified is the snagging risk of leaving infrastructure in-situ. Strategies to mitigate this risk are to consult with fishery licence holders and to mark the infrastructure on nautical charts so that fisheries are aware of its existence.

We trust that this addresses your concerns and provides further justification for Eni's decision for leaving infrastructure in situ. Please find attached copies of the reports referred to above for your review. We would welcome the opportunity to discuss this with you further, however, should you require further information do not hesitate to contact either myself or [redacted]

*Contact details provided.*

**06.09.2016 - Project update letter (OPS.LT.4595.DOF.TC) emailed and sent by post.**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.

In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:

- The field has been monitored through in-field surveys, most recently in August 2016.
- Wells are scheduled to be permanently plugged in 2018.
- The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.
- The 500 m petroleum safety zone around the field remains in place.

Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].
[redacted]
[redacted]
[redacted]

Yours sincerely

[redacted]
[redacted]

*Attachments:*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**28.09.16 Email sent to DoF**

Hi [redacted]

I'm hoping to confirm flights by the end of the week but it looks like I will be in Perth and free on the 25th of October if we could tentatively pencil in a time to catch up at your offices.

Thanks for your direction the other day to the "State of the Fisheries", haven't yet sunk my teeth right into it but it looks to be a useful tool. I was hoping though you would be able to provide the spatial data for the managed fisheries as well?

Also wanting to update our individual licence holder list and can't seem to find the link to go and purchase the latest versions for each fishery, any chance you might be able to point me in the right direct?

Really appreciate your help and look forward to catching up soon.

Cheers

[redacted]
[redacted]

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| | Social Responsibility |
| | **28.09.16 Email received from DoF**<br>Hi [redacted]<br>The 25 October is fine with for us, please feel free to send through a calendar invitation or suggested time and I'll book a meeting room.<br>I can request the spatial boundaries of the fisheries from the GIS group (note it won't include catch data as that's subject to confidentiality) however this may take 2 and 3 weeks to come through, is that ok?<br>Do you require the boundaries for all the fisheries the Department identified previously – see attached? As discussed some of the catch data is published in the "State of the Fisheries" report and another additional source is the Status of key Australian fish stocks - www.fish.gov.au/reports/Documents/SAFS_Reports_2014.pdf<br>An extract from the public register is available on the commercial licence form page on our website – link for both below – details of where to send the form are on the top left corner.<br>http://www.fish.wa.gov.au/Fishing-and-Aquaculture/Commercial-Fishing/Commercial-Fishing-Licences/Pages/Commercial-Licence-Forms.aspx<br>http://www.fish.wa.gov.au/Documents/commercial_fishing/r-1_application.pdf<br>Please let me know if you need anything else before we meet in October.<br>Kind regards<br>[redacted] |
| **Austral Fisheries** | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5427.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |
| | **14.03.19 – Email response from [redacted] Austral Fisheries**<br>No problem for us |
| | **21.07.15 - Updated consultation letter sent by post.**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.<br>Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.<br>This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.<br>As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.<br>All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).<br>NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.<br>Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.<br>**Location and History of the Field** |

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

| | |
|---|---|
| | • 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.<br>*Attachments*<br>*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*<br>*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Wollybutt Field - Location WA-25 L with Depths* |
| | **21.07.15 - Received email**<br>Thanks [redacted] I can't see this being a problem for us.<br>Regards<br><br>[redacted] |
| | **06.09.2016 - Letter (OPS.LT.4591.Austral.TC) emailed and sent by post.**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed to [redacted].<br>[redacted]<br>Yours sincerely<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Wollybutt Field - Location WA-25 L with Depths* |
| | **06.09.2016 - Email response**<br>Thanks [redacted], I am checking with our associates but looks like just information that you are sharing here.<br>Ta<br>[redacted] |
| **Commonwealth Fisheries Association (CFA)** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |

**11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5427.STKH.TC**)**

Refer to AFMA consultation for full letter content.

**01.05.2018 – Consultation letter emailed (OPS.LT.5115.Comfish.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| Confirmed wells to be plug and abandoned | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |

| Additional wells which may be added to the program | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations. |

| | |
|---|---|
| | • Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**12.05.2015 - Consultation letter emailed**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Wollybutt Field - Location WA-25 L with Depths*

**21.07.15 - Updated consultation letter emailed and sent by post.**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

| | |
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| | **Field Equipment to be Decommissioned**<br><br>The following decommissioning activities will take place.<br><br>The flowlines will be disconnected from the subsea trees.<br><br>*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*<br><br>The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.<br><br>All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.<br><br>Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.<br><br>Flowlines<br>• The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.<br><br>Six Anchors<br>• Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.<br><br>Six Anchor Mooring Chains<br>• Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.<br><br>Two Mid Depth Gravity Bases<br>• These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.<br><br>Umbilicals<br>• Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.<br><br>Subsea Trees<br>• 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.<br><br>Wellheads<br>• 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.<br><br>*Attachments*<br><br>*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*<br><br>*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*<br><br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br><br>*Woollybutt Field - 500m Exclusion Zone*<br><br>*Woollybutt Field - Location WA-25 L with Depths* |
| | **06.09.2016 - Letter (OPS.LT.4592.Comfish.TC) emailed and sent by post.**<br><br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni* |

| | |
|---|---|
| | Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br><br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br><br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br><br>All communications in relation to this should be directed to [redacted], [redacted].<br>[redacted]<br><br>Yours sincerely<br>[redacted]<br><br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **Kailis Bros.** | **25.09.2020 –Consultation letter emailed and posted (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5426.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |
| | **01.05.2018 – Consultation letter (OPS.LT.5120.Kailis.TC)**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.<br>**Background**<br>Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.<br>From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.<br>This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.<br>Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.<br>**Activity overview** |

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2**

provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed |

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| | of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Deputy Operations Manager

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**21.07.15 - Consultation letter sent by post.**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

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- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

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*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

| | |
|---|---|
| | **21.07.15 - Received email response**<br>Hi Rob,<br>We have no issues with this decommissioning or leaving some items on the seabed.<br>Cheers<br>[redacted] |
| | **06.09.2016 - Letter (OPS.LT.4597.Kailis.TC) emailed and sent by post**<br>Dear Stephen,<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed to [redacted], [redacted].<br>[redacted]<br>Yours sincerely<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **A Raptis and Sons** | **25.03.2021 –Consultation email sent**<br>Refer to AFMA consultation for full letter content. |
| | **25.09.2020 –Consultation letter posted (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5426.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |

**01.05.2018 – Consultation letter (OPS.LT.5122.Raptis.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |

| | | |
|---|---|---|
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013. |

| | |
|---|---|
| | • Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

1. Figure 1: Location of WA-25 L with depths
2. Figure 2: Woollybutt Field – 500m Exclusion Zone

**12.05.15 - Consultation letter emailed**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**21.07.15 - Updated consultation letter emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT*

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| | *protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*<br>The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.<br>All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.<br>Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.<br>Flowlines<br>• The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.<br>Six Anchors<br>• Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.<br>Six Anchor Mooring Chains<br>• Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.<br>Two Mid Depth Gravity Bases<br>• These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.<br>Umbilicals<br>• Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.<br>Subsea Trees<br>• 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.<br>Wellheads<br>• 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.<br>*Attachments*<br>*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*<br>*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| | **06.09.2016 - Letter (OPS.LT.4598.Raptis.TC) emailed and sent by post.**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018. |

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| | • The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br><br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br><br>All communications in relation to this should be directed to [redacted], [redacted].<br>[redacted]<br>[redacted]<br>[redacted]<br><br>Yours sincerely<br>[redacted]<br>[redacted]<br><br>*Attachments:*<br><br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Wollybutt Field - Location WA-25 L with Depths* |
| **Pearl Producers Association** | **25.03.2021 –Consultation email sent**<br><br>Refer to AFMA consultation for full letter content. |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br><br>Refer to AFMA consultation for full letter content. |
| | **11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5426.STKH.TC**)**<br><br>Refer to AFMA consultation for full letter content. |
| | **01.05.2018 – Consultation letter (OPS.LT.5121.PPA.TC)**<br><br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br><br>Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.<br><br>**Background**<br><br>Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.<br><br>From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.<br><br>This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.<br><br>Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.<br><br>**Activity overview**<br><br>The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).<br><br>The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys. |

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

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| | Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.<br><br>All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br><br>All communications in relation to this should be directed to [redacted], [redacted].<br>[redacted]<br><br>Yours sincerely<br>[redacted]<br><br>Attachments:<br>1. Figure 1: Location of WA-25 L with depths<br><br>Figure 2: Woollybutt Field – 500m Exclusion Zone |
| **Recfishwest** | **25.03.2021 –Consultation email sent**<br><br>Refer to AFMA consultation for full letter content. |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br><br>Refer to AFMA consultation for full letter content. |
| | **25.08.2020.** - Recfishwest have provided preliminary feedback that it may not be feasible to utilise the buoys. |
| | **25.06.2020 -** Meeting between Recfishwest and Eni to discuss possibility of reusing MDBs for artificial reefing. Information on MDBs including coating provided to Recfishwest for review |
| | **11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5426.STKH.TC**)**<br><br>Refer to AFMA consultation for full letter content. |
| | **01.05.2018 – Consultation letter (OPS.LT.5123.Recfish.TC)**<br><br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br><br>Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.<br><br>**Background**<br><br>Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.<br><br>From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.<br><br>This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.<br><br>Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.<br><br>**Activity overview**<br><br>The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).<br><br>The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys. |

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013.<br>• Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

3. Figure 1: Location of WA-25 L with depths
4. Figure 2: Woollybutt Field – 500m Exclusion Zone

**12.05.15 - Consultation letter emailed**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**21.07.15 - Updated consultation letter emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a

| | |
|---|---|
| | radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.<br>Two Mid Depth Gravity Bases<br>• These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.<br>Umbilicals<br>• Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.<br>Subsea Trees<br>• 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.<br>Wellheads<br>• 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.<br>*Attachments*<br>*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*<br>*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |

| | |
|---|---|
| | **06.09.2016 - Letter (OPS.LT.4599.Recfish.TC) emailed and sent by post**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed [redacted], [redacted].<br>[redacted]<br>Yours sincerely<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| **Western Australian Fishing Industry Council (WAFIC)** | **24.05.2021 – Draft minutes of meeting**<br>Hi [redacted]<br>Thanks for sending that through.<br>Please also find attached minutes of our meeting on the 13 May. Please let me know if you have any updates that you would like me to make to the minutes. If you don't have any updates can you please reply letting me know that you accept them as is?<br>Also, I have attached the Atteris degradation study that has informed the risk assessment in the EP and which we agreed to provide at the meeting.<br>Thanks<br>Attachments<br>1. Draft minutes of meeting 13.05.2021 (below)<br>2. Atteris Degradation Report and Plastics Impact assessment |
| | **19.05.2021 – Information received from WAFIC**<br>Hi [redacted]<br>As discussed at our meeting on the 13/5/21, please find attached a document that explains why the area was closed to trawling, which also includes the Woollybutt Field.<br>I have contacted some of the Pilbara Trawl Fishers, regarding snag risks but have not had a reply yet. From previous correspondence regarding this issue, the feedback is to ensure they can trawl in that area, so the total removal of wellhead and other infrastructure would be the base case preferred option.<br>Kind regards<br>[redacted]<br>Attachments |

Looby, G. 1997 Fisheries Discussion Paper: Management Options for Pilbara Demersal Line Fishing. Fisheries management paper No. 111, Fisheries Western Australia.

**13.05.2021 – Meeting between Eni and WAFIC (meeting minutes – items related to P&A, Field Management and Equipment Removal EP only)**

**Purpose of the Meeting:**

- Discuss and resolve or agree a way forward on the following points that have been raised by WAFIC during consultation:
    - Potential for the infrastructure to cause a snag risk

**Snag Risks**

Background:

During initial consultation WAFIC asked Eni to provide assurance of the long term safety case regarding infrastructure being left in situ. Eni responded confirming that the area is currently closed for trawling and in anticipation of the area re-opening to trawling in the future the infrastructure will continue to be marked on navigation charts.

Points discussed at the meeting:

- WAFIC described the risk presented by seabed obstacles, whereby nets could become snagged and vessels may continue to travel some distance before the equipment becomes taut and exerts pulling force on the vessel. WAFIC confirmed that there have been instances in the industry where this has caused vessels to capsize. This is WAFIC's main concern when considering snag risks.
- WAFIC confirmed that the snag risk is not only related to the height of the infrastructure and also depends on the weight of the catch at the time the snag happens.
- Eni discussed recent feedback received verbally from DPIRD which confirmed that for equipment left on the seabed the preference is for equipment to be marked on navigation charts rather than installation of over-trawlable structures. This is on the basis that there is not enough science to support that over-trawlable structures would completely illuminate the snag risk. WAFIC acknowledged this position.
- Eni confirmed that the controls that could be considered are:
    - Marking infrastructure on navigation chats without an exclusion (already proposed in the EP)
    - Marking infrastructure on navigation charts with an exclusion zone
    - Install over trawlable structures and/or rock dumping
- WAFIC confirmed that marking on navigation charts would be a minimum expectation.
- WAFIC confirmed that the fishers would need to comment on the possibility of including an exclusion zone.
- WAFIC confirmed that there is not enough science to confirm whether over-trawlable structures would remove the snag risk completely.

Proposed action to move forward:

- Eni to incorporate WAFIC feedback into the EP and accurately reflect the snag risk in the impact assessment of the EP
- WAFIC to follow up with trawl fishers on whether they have feedback on the controls that Eni could consider

**13.11.2020 – Email reply from WAFIC to Eni**

Many thanks for the confirmation [redacted] much appreciated

**13.11.2020 – Email reply from Eni to WAFIC**

Hi [redacted]

I can confirm that wording committing Eni, contractor and sub-contractor vessels inductions cover 'the importance of marine communications regarding any potential interactions with active commercial fishing' has been included in the EP and will be included in induction material / procedure as per this EP commitment.

Thanks

[redacted]

**12.11.2020 – Email reply from WAFIC to Eni**

Thank you [redacted]

Look forward to the next stage when the decommissioning consultation commences.

Note the following point:

-Please also ensure for all of the above activities that Eni please remind all transiting support vessels (Eni-owned, contractor and sub-contractor) to keep well clear of commercial fishing activities. – Eni have noted this comment for transiting support vessels.

This may appear to be small but it is important for us and can be at times, irksome and unnecessarily ugly on the water.

Other operators reply along the following lines – this way we know that ENI hasn't just "noted this comment" but have recorded it and incorporated this into the Ep and the process .

Words along the line of " ENI inductions for support vessels - ENI vessels, contractor and sub-contractor vessels - will include a topic to reinforce the importance of marine communications regarding any potential interactions with active commercial fishing".

Please confirm that this request has been "passed down to the line" and not just noted.

Many thanks and best regards

**09.10.2020 – Email reply from Eni to WAFIC**

Hi [redacted]

Thank you for your email.

The below points are in response to your queries:

- Will the exclusion zone stay in place until decommissioning? If not, what is Eni's risk / snag etc. mitigations? - The 500 m PSZ covers the production equipment (production wellheads) on the seabed, once this equipment is removed (an activity under the Woollybutt Field Management and Plug and Abandonment EP) the 500m PSZ will be revoked. Some flowlines and umbilicals on the seabed extend beyond the 500 m PSZ and non-production wellheads have historically not been within the 500 m PSZ, therefore there will be limited change in the risk. Eni do not anticipate snag risk due to Pilbara Zone 1 being closed at present, however understand this may not always be the case. Flowlines and umbilicals have also begun to self-bury, further reducing risk. As mentioned in previous correspondence, the decommissioning planning for the flowlines, umbilicals and non-production wellheads has commenced and as part of the decommissioning EP process, further consultation will be undertaken and the future risk (including snag risk) that this infrastructure has on the commercial fisheries will be assessed and reduced to a level that is ALARP and acceptable. Eni note the importance of engaging with fisheries license holders early in the decommissioning planning.
- Catch data has also shown that the Woollybutt field and wider permit area surrounding it has not been used by trawler fishers in the last 4 years. This comment is vague – in Zone 1, there has been no fishing activity since 1998. What area within the Pilbara Trawl fishery is Eni referring to please? Any other trawl fishers (ie prawn) covered by this comment? – Eni collected catch data for the Pilbara Trawl fishery within the 60NM and 10NM grid blocks that cover WA-25-L (all in zone 1) and it indicated (as you would expect) that there has been no catch recorded in the last 4 years. The data collected also showed no record of prawn trawling catch in those grid blocks.
- It is essential that WAFIC and commercial fishers are part of the decommissioning process at the front end – ie at the beginning, not a token add-on at the end. – The stakeholder engagement strategy for the decommissioning is being developed. Eni recognizes the importance of engagement with commercial fisheries and will be consult with fishing stakeholders as we start decommissioning planning and developing the decommissioning EP. Eni have noted the particular importance of engaging with Pilbara Trawl fishery license holders on future issues that could arise if infrastructure is left in-situ.
- Please also ensure for all of the above activities that Eni please remind all transiting support vessels (Eni-owned, contractor and sub-contractor) to keep well clear of commercial fishing activities. – Eni have noted this comment for transiting support vessels.

Eni will provide further information on the future decommissioning program and will take into account your feedback on consultation letter (OPS.LT.6325.WAFIC.SD) sent to WAFIC on 1 October when developing the consultation letter.

Please let us know if you have any questions.

Thanks

[redacted]

**07.10.2020 – Email response received from WAFIC**

Hello [redacted]

As per the track record WAFIC has with ENI / Woollybutt it continues to be as clear as mud. I reiterate, WAFIC is a not-for-profit peak body representing the commercial fishing sector, we are not the unpaid secretarial service / information review office for ENI, [redacted] any other entity.

After follow-up phone calls thank you for confirming that this consultation relates to the in-force 'Woollybutt Field Management and Plug and Abandonment EP' which is being revised to include removal of subsea equipment scopes (within the 500m exclusion).

In addition to the Woollybutt Field Management and Plug and Abandonment EP you have noted that Eni is providing early information on a proposed decommissioning approach and are keen to understand the degree to which WAFIC would like to be consulted on this decommissioning going forward and / or any

feedback on the leave in-situ option. This decommissioning is in the planning stages and will be the subject of a separate EP.

Decommissioning is very important to WAFIC and our stakeholders. It is our expectation that we are all in at the front end of decommissioning engagement, key point being that where there is a positive impact ie a sustainable environment and eco-system and as long as it is safe to do so (appropriately cleaned, hazards etc removed) and as long as it is not a snag hazard for our trawl fisheries.

See my comments below in GREEN. Look forward to your reply.

Please also note your fishery information in your fact sheet is wrong – the Pilbara Trap, Trawl and Line fisheries are completely separate fisheries, not to be grouped under one "fishery".

Best regards

| | **Note / Response** |
|---|---|
| **Reason for consultation** | 1. To provide an update on ongoing field management and proposed P&A and removal of subsea equipment scopes at Woollybutt.<br>2. Eni would also invite any feedback WAFIC may have on leaving non-production well heads, flowlines and umbilicals in-situ during decommissioning. Remaining flowlines range from 2½" to 6" in diameter and approximately 20 km in total length, and umbilicals are 3½" in diameter and approximately 8 km in total length. ***This is not enough information, inappropriate to provide comment, WAFIC looks forward to a quality level of information when you start the decommissioning consultation.*** |
| **Anything new from previous consultation?** | Yes,<br>- Eni are confirming the removal of some subsea equipment from the field (wellheads, single point mooring and mid-depth buoys). ***Within the current exclusion zone? Will the exclusion zone stay in place until decommissioning? If not, what is Eni's risk / snag etc mitigations?***<br>- Eni would also like to seek any feedback you have on leaving non-production well heads, flowlines and umbilicals in-situ on the seabed as part of decommissioning of the field. ***This is not enough information, inappropriate to provide comment, WAFIC looks forward to a quality level of information when you start the decommissioning consultation.*** |
| **Are these activities within the 500m exclusion zone** | - Ongoing field management and proposed P&A and removal of subsea equipment scopes are with the 500m exclusion zone. ***We like this, the status quo remains the same, commercial fishers cannot access areas within the exclusion zone, therefore not impacted by these activities. We are all keen to know that once this work is completed when these exclusion zone (s) will be removed.***<br>- In the event that infrastructure is left in-situ as part of decommissioning, the infrastructure would not be covered by an exclusion zone. ***WAFIC looks forward to a quality level of information when you start the decommissioning consultation. Note we do love having exclusion zones removed.*** |
| **Feedback from the Trawl fisheries overlapping this site** | - Eni have requested feedback from the individual license holders. The field is located within Zone 1 of the Fishery, which has been closed to trawling. ***Appreciate Pilbara Trawl Zone 1 has been closed since 1998, however, it is still part of the fishery, Eni must recognised potential future use. Please be very specific regarding this potential future use when engaging with Pilbara Trawl fishery licence holders at the decommissioning stage.***<br><br>Catch data has also shown that the Woollybutt field and wider permit area surrounding it has not been used by trawler fishers in the last 4 years. ***This comment is vague – in Zone 1, there has been no fishing activity since 1998. What area within the Pilbara Trawl fishery is Eni referring to please? Any other trawl fishers (ie prawn) covered by this comment?*** |
| **Impacts to fisheries** | - As the ongoing field management and proposed P&A and removal of subsea equipment scopes are with the 500m exclusion zone, therefore risks are negligible to fisheries. ***Agree.***<br>- In the event that non-production well heads, flowlines and umbilicals are left in-situ, these will remain on the seabed and could lead to |

| | |
|---|---|
| | snag risks should trawling occur over the area in subsequent years. ***Completely unacceptable and dangerous to trawl fishers. Eni owns this risk, not the trawl fishers. I am "assuming" this will be part of the detailed consultation Eni will do with the commercial fishing industry for the decommissioning EP? Please advise.*** |
| **Next steps / future consultation** | - The ongoing field management and proposed P&A and removal of subsea equipment scopes within the 500m exclusion are of negligible impact to fisheries, subsequent consultation is understood not to be required. ***Agree. Not for this work within the 500m radius exclusion zone.***<br>- Eni would like to understand the degree to which WAFIC would like to be consulted during the decommissioning decision making, particularly regarding any decision to leave infrastructure in-situ. ***It is essential that WAFIC and commercial fishers are part of the decommissioning process at the front end – ie at the beginning, not a token add-on at the end.*** |

*Please note, it is quite likely for this EP and the upcoming EP that commercial fishers are the ONLY "relevant and potentially affected parties" to these activities.*

*Please also ensure for all of the above activities that Eni please remind all transiting support vessels (Eni-owned, contractor and sub-contractor) to keep well clear of commercial fishing activities.*

**07.10.2020 – Email reply from Eni to WAFIC**

Hi [redacted]

Following from our phone conversation:

- This consultation relates to the in-force 'Woollybutt Field Management and Plug and Abandonment EP' which is being revised to include removal of subsea equipment scopes (within the 500m exclusion).
- We are providing early information on a proposed decommissioning approach and are keen to understand the degree to which WAFIC would like to be consulted on the decommissioning going forward and / or any feedback on the leave in-situ option. This decommissioning is in the planning stages and will be the subject of a separate EP.

Sorry again for the confusion regarding the scopes and information provided.

Thanks

**07.10.2020 – Phone conversation between Eni to WAFIC**

WAFIC requested Eni provide further detail on the split between the Woollybutt Field Management and Plug and Abandonment EP' and the future decommissioning program. Iterated that if the Woollybutt Field Management and Plug and Abandonment EP activities are within the 500 PSZ then they have no interest. However will have interest in future decommissioning.

**05.10.2020 – Email reply from Eni to WAFIC**

Hi [redacted]

Thank you for your response (and apologies for the misspelling of your name), I have tried to clarify a few points regarding the consultation in the below, so things are clearer:

| | **Note / Response** |
|---|---|
| **Reason for consultation** | 3. To provide an update on ongoing field management and proposed P&A and removal of subsea equipment scopes at Woollybutt.<br>4. Eni would also invite any feedback WAFIC may have on leaving non-production well heads, flowlines and umbilicals in-situ during decommissioning. Remaining flowlines range from 2½" to 6" in diameter and approximately 20 km in total length, and umbilicals are 3½" in diameter and approximately 8 km in total length. |
| **Anything new from previous consultation?** | Yes,<br>- Eni are confirming the removal of some subsea equipment from the field (wellheads, single point mooring and mid-depth buoys).<br>- Eni would also like to seek any feedback you have on leaving non-production well heads, flowlines and umbilicals in-situ on the seabed as part of decommissioning of the field. |
| **Are these activities within the 500m exclusion zone** | - Ongoing field management and proposed P&A and removal of subsea equipment scopes are with the 500m exclusion zone. |

| | |
|---|---|
| | - In the event that infrastructure is left in-situ as part of decommissioning, the infrastructure would not be covered by an exclusion zone. |
| **Feedback from the Trawl fisheries overlapping this site** | - Eni have requested feedback from the individual license holders. The field is located within Zone 1 of the Fishery, which has been closed to trawling. Catch data has also shown that the Woollybutt field and wider permit area surrounding it has not been used by trawler fishers in the last 4 years. |
| **Impacts to fisheries** | - As the ongoing field management and proposed P&A and removal of subsea equipment scopes are with the 500m exclusion zone, therefore risks are negligible to fisheries.<br>- In the event that non-production well heads, flowlines and umbilicals are left in-situ, these will remain on the seabed and could lead to snag risks should trawling occur over the area in subsequent years. |
| **Next steps / future consultation** | - The ongoing field management and proposed P&A and removal of subsea equipment scopes within the 500m exclusion are of negligible impact to fisheries, subsequent consultation is understood not to be required.<br>- Eni would like to understand the degree to which WAFIC would like to be consulted during the decommissioning decision making, particularly regarding any decision to leave infrastructure in-situ. |

Kind regards

[redacted]

**02.10.2020 – Email response received from WAFIC**

Hello [redacted]

I have a significant and large folder on the historical engagement between WAFIC and ENI regarding the Woollybutt field (must admit, my favorite name for a field).

Please find attached the last email between WAFIC and ENI of 14th March 2019.

Key points:

- My name is spelt SHEA
- Are all f these activities described in the above long fact sheet as per the original EP still taking place in a pre-existing exclusion zone?
- You've noted an "invitation to consult"

o ENI has already communicated a stack of times re Woollybutt

What is the purpose of this "consultation"???? It's as clear as mud

You have described the fisheries and if they have / have not fished in the area

You have not described and noted in clear dot pints if any of these activities will impact commercial fishers

Will all of these updated activities be contained in the Exclusion Zone as per previous EP communications?

Is there anything new from the previous communications?

- Commercial fishers CANNOT enter, transit, anchor or fish in an exclusion zone therefore for these activities – if still contained within the exclusion zone - we have no interest
- Stakeholder fatigue is gargantuan – DO NOT send out a 14 page wordy detailed fact sheet to WAFIC and commercial fishers if not necessary.

o No-one will read it, we don't have the time

o It is your job to prepare bespoke commercial fisher-relevant clear and succinct information re where we may be impacted

- If you want to send a long wordy document to cover your back, then you MUST provide succinct dot point descriptors in your covering email

o Don't make me or fishers do your work for you (see fatigue comment above)

o "Consultation" needs to be genuine and real, not a "tick the box" exercise to meet your NOPSEMA EP commitments

o Commercial fishers need direct and relevant info re what can / may impact them.

| | |
|---|---|
| | • If you are worried that by not updating WAFIC and commercial fishers that the EP will be subject to ugly NOPSEMA scrutiny – then please use this email as a notification that this update is not necessary.<br>Please also note in the email above from [redacted] the following ENI / WAFIC comments:<br>• Decommissioning of assets and potential removal of assets will be assessed at a later stage and stakeholders reconsulted<br>• How much of this built up marine environment is ENI planning on leaving behind? This will be assessed as part of future decommissioning program. Decommissioning options will be assessed and all relevant stakeholders will be reconsulted as part of this process. Current scope, as per the letter, is solely for the plug and abandonment of the asset<br>• Especially important that ENI gains feedback from the Trawl fisheries overlapping this site (potential trawl hazards). This is currently being undertaken. Please note as per comment above, until decommissioning of assets is undertaken subsea hazards from assets will remain unchanged. Future consultation will be undertaken during the development of decommissioning options.<br><br>The early Woollybutt decommissioning activities are taking place in pre-existing exclusion zones (please advise if this has changed), therefore the actual physical early stage decommissioning activities will not directly disrupt commercial fishing.<br>Commuting supply and support vessels etc are very important and can negatively impact - very important they you re-communicate with your employees, contractors and subcontractors to ensure they are reminded to keep well clear of any commercial fishing activities.<br>Please especially note: WAFIC is a not-for-profit peak body representing the commercial fishing sector, we are not the unpaid secretarial service / information review office for [redacted] or any other entity. Please find attached WAFIC's fee-for-service information.<br>Best regards |
| | **25.09.2020 –Consultation letter emailed (OPS.LT.6325.WAFIC.SD)**<br>**Woollybutt Field – Stakeholder Consultation**<br>Eni Australia Limited (Eni) is currently undertaking ongoing field management activities within the Woollybutt field, located in Production Licence WA-25-L within Commonwealth waters. Woollybutt production ceased in 2012 and all associated subsea equipment remains in the Woollybutt field and within a 500 m Petroleum Safety Zone (PSZ).<br>Eni has an Environment Plan (EP) in place for the current ongoing field management activities, which was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in 2019.<br>Eni is submitting a revised EP to NOPSEMA for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (the regulations) to reflect the current status of the subsea field infrastructure, the proposed P&A activities and the proposed recovery of certain subsea production equipment.<br>Consultation material provided in 2015, 2016 and 2019 has kept stakeholders informed regarding the status of the Woollybutt field and future plans. This consultation bulletin provides an update on ongoing field management, field status and proposed plug and abandonment (P&A) and equipment recovery activities.<br>**Current status of equipment**<br>In January 2020, during visual inspection by a remotely operated vehicle (ROV), the Woollybutt Disconnectable Single Point Mooring (DSPM) was noted to have sunk to the seabed from its previous location at 35 m water depth due to a buoyancy failure.<br>In August 2020, one mid-depth buoy (MDB) was noted to have risen to the sea surface from its previous location at 50 m water depth, due to tether failure.<br>The floating buoy remains stationary within the 500 m Petroleum Safety Zone and is under 24-hour surveillance by a dedicated vessel on location. Inspection confirms there is no evidence of hydrocarbon release. At the time of writing, remediation planning is ongoing to remove the hazard.<br>All other subsea production equipment, including the second MDB, remains in place within the Woollybutt Field 500 m PSZ.<br>**Location**<br>The Woollybutt field is located in production license WA-25-L in approximately 100 m of water, 65 km north of Onslow and 35 km west of Barrow Island (**Attachment 1**) within Commonwealth waters. A summary of the key field infrastructure, locations and status are provided in **Table 1**.<br>The Woollybutt field subsea infrastructure are marked on nautical charts surrounded by a 500 m Petroleum Safety Zone (PSZ), which excludes other marine users from the area (**Attachment 2**).<br><br>**Table 1: Summary of the Key Woollybutt Infrastructure** |

| Infrastructure | Longitude | Latitude | Status |
|---|---|---|---|
| Scallybutt-1 well (SB1) | 114 53.447 | -20 55.078 | Shut-in production wells to be P&A. |
| Woollybutt-4 well (WB4) | 114 52.102 | -20 53.27 | |
| Woollybutt-2A well (WB2A) | 114 54.373 | -20 55.069 | |
| Woollybutt-1 well (WB1) | 114 54.524 | -20 54.266 | |
| Woollybutt-3A (WB3A) | 114 52.406 | -20 58.043 | Suspended wells – may be included in P&A campaign. |
| Woollybutt-5A (WB5A) | 114 51.703 | -21 00.000 | |
| Disconnectable Single Point Mooring (DSPM) | 114 54.441 | -20 54.599 | The DSPM is currently located on the seabed, located within the 500 m PSZ. |
| Mid-depth buoy (north), chains and gravity base | 114 54.450 | -20 54.582 | The northern mid-depth buoy is currently floating on the sea surface within the 500 m PSZ and is under 24-hour surveillance. |
| Mid-depth buoy (south), chains and gravity base | 114 54.444 | -20 54.646 | The southern mid-depth buoy remains in place at 50 m water depth. |

**Activities**

The revised EP includes activities relating to the field management, well plug and abandonment (P&A) activities and recovery of certain subsea production equipment. Activities undertaken as part of the scope of the revised EP are presented in **Table 2**.

**Table 2: Summary of Activities**

| Activity | Summary | Frequency and duration |
|---|---|---|
| Field Management | Use of remotely operated vehicles (ROV) deployed from a vessel to perform field management scopes, including:<br>• Cathodic Protection (CP) surveys;<br>• General Visual Inspections (GVI);<br>• Inspection, monitoring, maintenance and repair (IMMR). | On an ongoing basis, as per the Eni Integrity Management Plan (IMP) strategy. Typically undertaken in 7-14 days. |
| P&A | Mobilisation of an Intervention Vessel (IV) to the field with integrated services to perform well P&A on four to six wells. Logistical support is provided by up to three offshore support vessels and helicopter services.<br>Well P&A activities will include the setting of plugs and cement barriers at specified depths in the wells to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment. Following plugging, wellheads will be cut at the seabed and retrieved. | Target execution window is 2Q 2021 – 2Q 2022[1]. It is anticipated P&A of each well will take approximately 10-20 days. |
| Recovery of subsea production equipment | The recovery of subsea production equipment will be undertaken using the IV and support vessels. The following equipment is proposed to be recovered from the field and taken to shore for disposal, recycling or reuse, in accordance with applicable legislation:<br>• Mid-depth buoys, chains/tether and gravity bases;<br>• Disconnectable Single Point Mooring;<br>• Subsea structures (including manifolds and umbilical termination assemblies).<br>During the activity, anchors, chains, flowlines and umbilicals will be disconnected, and remain in situ until future decommissioning. | Target execution window for mid-depth buoy removal is Q4 2020[1].<br>Removal of DSPM and listed subsea structures to follow the P&A campaign and anticipated to take approximately 20-30 days. |

Note 1: subject to project variables including but not limited to vessel availability, regulatory approvals and weather.

**State Fisheries Licensed to Fish in WA-25-L**

State Fisheries licensed to fish in WA-25-L are presented in **Table 3**.

Eni has consulted each of the fishing licence holders potentially impacted to seek their comment regarding the proposed activities.

**Environmental Management**

Eni assessed the environmental risk assessment for the ongoing field management, proposed P&A activities and removal of subsea production equipment, giving consideration to activity timing, durations, location and potential environmental impacts. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

Table 4 provides a summary of potential key environmental risk and/or impacts and associated management measures identified.

**Future Decommissioning**

Decommissioning of the remaining Woollybutt field subsea components (anchors, chains, four non-production well heads, flowlines and umbilicals) will be subject of a separate EP. Until decommissioning, field management will be ongoing to maintain remaining components in accordance with Section 572 of the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGS Act). Remaining flowlines range from 2½" to 6" in diameter and approximately 20 km in total length, and umbilicals are 3½" in diameter and approximately 8 km in total length.

A comparative assessment process has been undertaken to evaluate a range of decommissioning options for the remaining components, including complete removal, partial removal and leave insitu. Options were assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks. The assessment has determined that leaving the remaining components insitu would provide the best overall outcome. In particular, the equipment would continue to provide hard substrate for marine habitat growth on an otherwise featureless seabed.

Studies are ongoing and stakeholder feedback will be taken into consideration.

**Stakeholder Comment and Feedback**

Your comment is sought in relation to any potential impact that the ongoing field management, proposed well P&A activities and recovery of subsea production equipment may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 26 October 2020 to the contact details provided below.

Eni also seeks any comment from stakeholders regarding insitu decommissioning of remaining subsea components, and whether they would like to continue to be consulted in these matters as the decommissioning EP is developed.

All comments provided will be considered in the respective revision of Eni's Woollybutt EP to be submitted to NOPSEMA, in accordance with the OPGGS Act.

All communications in relation to this should be directed to:

[redacted]

**14.03.2019 – ENI response**

Dear [redacted]

Thank you for your email, we appreciate your detailed feedback. Please see our response below.

I am also available to discuss further should you wish.

Best regards,

[redacted]

*Eni is committed to the goal of zero harm to people and the environment.ï¿½ Eni reminds you that printing has a cost on the environment.*

**From:** [redacted]

**Sent:** Tuesday, 12 March 2019 1:43 PM

**Subject:** 2019 Mar 12 - Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni - WAFIC reply [External Sender]

Hello [redacted]

Many thanks for the email received yesterday.

Note the two attachments above. Are these new documents? Previously sent documents? There is no date on either document, without a date they have no "value" – please advise. There's also no page numbers – hard to refer back to information quoted. New documents but only an update providing additional information on proposed activities and management measures compared to previous information sent. Apologies for omitting date and page numbers, this will be rectified in future consultation.

Note the locations have been described in Eastings and Northings. Commercial fishing information and our supporting maps etc are all in latitudes and longitudes. Eastings and Northings are not helpful. Any information I cross-check is in lats and longs. Note your attached map is in lats and longs – this information should have been included up front. Please provide consistent information in a manner suitable for your stakeholders. It helps with relationship building, it helps with delivering a clear message! Noted and apologies, as you have mentioned this before. Please see the coordinates in lat longs below.

| Well | Latitude | Longitude |
|---|---|---|
| Confirmed wells to be plug and abandoned | | |
| Scalybutt-1ST1 (SB1) | 20°55'04.26"S | 114°53'26.96"E |
| Woollybutt-4ST1 (WB4) | 20°57'16.20"S | 114°52'06.10"E |
| Woollybutt-2A-ST3 (WB2A) | 20°55'08.89"S | 114°54'17.52"E |
| Woollybutt-1ST2 (WB1A) | 20°54'15.72"S | 114°54'31.48"E |
| Additional wells which may be added to the program | | |
| West Barrow 1A | 20°53'26.93"S | 114°54'52.26"E |
| Woollybutt-3A2 | 20°58'02.56"S | 114°52'24.38"E |
| Woollybutt-5A3 | 21°0'0.08"S | 114°51'42.21"E |

You note fisheries which overlap this activity on one page and then note of these fisheries you have reviewed who are potentially active on another page. Then you have an attachment titled Table 3: State fisheries which includes additional fisheries which do not marry in with the information provided in your document. The information contained within your document should balance with the information in the table. It clearly doesn't. Table 3 is an assessment of all potential fisheries overlapping or in close proximity to the activities area. Table 3 clearly states the West Coast Deep Sea Crustacean Management Fishery, West Coast Rock Lobster Management Fishery and Beche de Mer Fishery do not overlap the operational area hence why these 3 are not discussed in the main text. However, we understand this may have led to some confusion and we will completely remove these three fisheries from the table in any potential future consultation.

There is also fishery information in the above documents which is substantially wrong. Please see responses below.

State managed fisheries (those fisheries noted in the text and those fisheries in Table 3):

- Pilbara Trawl – unclear from your map whether Woollybutt is in the Trap only sector or if it is just in the Pilbara Trawl Zone 1 closed section
    - If it is in the closed section they are still a relevant party to this activity because the closed section is not necessarily closed permanently. Therefore, being a trawl fishery they will want to know about potential trawl hazards (potential future use). Important they are in the loop. It is in the Pilbara Trawl zone 1 closed section which is also part of the trap fishery. Please note as per consultation letter the activity is solely for the purpose of the P&A. Decommissioning of assets and potential removal of assets will be assessed at a later stage and stakeholders reconsulted.
- Note for Mackerel – you should only be engaging with licence holders in Area 2 Pilbara – not all Mackerel licence holders. When you get an updated list from DPIRD (Fisheries) for mackerel make sure you ask for it to be split by the three zones. Many fishers only have a licence in one or two zones not necessarily all three zones. DPIRD are being engaged and updated list of licence holders has been requested. We will ensure we seek appropriate details.
- Specimen Shell is a wade and dive fishery – they do not dive in water depths of 100 metres. Ever. Fisheries status report states there is also exemptions which permits the use of ROV to depth up to 300m depth hence why we included this as a potentially impacted fishery, though we recognise

impacts are unlikely. If use of ROVs is considered unlikely to ever happen in the activities area we will take this into account in our assessment.

- The pearl industry via the Pearl Producers Association PPA must be consulted ( [redacted] ) unless [redacted] has advised otherwise. They may not fish at this water depth but stock may be breeding/ emanating from deeper areas. The PPA is being consulted.
- The South West Coast Salmon Fishery has never been active anywhere near the Woollybutt site. South-West Coast Salmon Managed Fishery includes all WA waters north of Cape Beaufort except Geographe Bay. It is called South-west because it is only fished in the south west. Also only in state waters and being a beach net fishery (the net goes out from the beach loops out and hauled back on to the beach), there is no way they will be operating 80 kilometres north west of Onslow at 100 metre water depth. In addition, it is a migratory specie, the annual "salmon run", rarely travelling much further north than metropolitan Perth, a freak run a couple of years ago saw a couple of fish sited near Exmouth (it made the news such a freak event). Therefore, there is no commercial fishing in the Woollybutt activity area, they do not exist in the activity area, they do not migrate through the activity area and they do not breed in the activity area. Ever. We agree. It is consistent with our table and text and conclusions. There is no fishing in the operational area.
- West Coast Rock Lobster – there is no fishing – ever – for western rock lobster in the area of this decommissioning activity. They should not have been included in the table (it unfortunately, like the above points, makes you look like you don't know what you are doing in relation to commercial fishing, we are your key / only potentially affected party at this site). We agree. It is consistent with our table and text and conclusions. There is no fishing in the operational area.
- 


Commonwealth Managed Fisheries (those fisheries noted in the text and those fisheries in Table 3):

- There is one active licence holder in the Western Tuna and Billfish Fishery, important he is consulted. Will be consulted.
- Southern Bluefin Tuna – no individual consultation required with licence / quota holders – there is zero fishing anywhere in WA for SBT. However, it is a very important migratory route, therefore they must be included as an important stakeholder – key contact is the Australian Southern Bluefin Tuna Industry Association ASBTIA ([redacted]). ASBTIA being consulted.
- Western Skipjack – the AFMA site clearly states this is a fishery under review – there has been no commercial fishing since around 2010, therefore zero fishing activity in the decommissioning area. Will take this into account as part of our assessment.
- Northwest Slope Trawl and Western Dee[water Trawl fisheries should not have been concluded in the table (again as per the state fisheries – information within your text should "balance" with information in your table). These fisheries both operate in water depths greater than 200 metres, therefore, not ever interacting with the Woollybutt site. As per above comment, these were included as we were reviewing fisheries within and surrounding the OA. As table (and text) clearly states they are not considered to overlap OA. However, agree it may have led to confusion and should be removed from the table.

| | |
|---|---|
| | The Woollybutt decommissioning activities are taking place in pre-existing exclusion zones, therefore the actual physical decommissioning activities will not directly disrupt commercial fishing. Commuting supply and support vessels etc are very important and can negatively impact - very important they keep well clear of any commercial fishing activities. Thank you for feedback.<br><br>Of particular importance to commercial fishers (different fisheries have different interests) are:<br>• Well heads etc are FADs (fish aggregation devices).<br>  ○ It is our expectation that over time a "natural environment" has built up in and around the decommissioning site and therefore is a marine habitat for commercial fishing species.<br>  ○ Many commercial fishers operate in water depths around 100 metres – these soon-to-be-available sites are of strong interest to them.<br>  ○ We like to protect our marine habitats – this is the commercial fishing industry's chance to get (potentially productive) areas back which have been excluded from for many years.<br><br>Thank you for this feedback<br>• How much of this built up marine environment is ENI planning on leaving behind? This will be assessed as part of future decommissioning program. Decommissioning options will be assessed and all relevant stakeholders will be reconsulted as part of this process. Current scope, as per the letter, is solely for the plug and abandonment of the assets.<br>• Has ENI consulted with individual licence holders seeking their feedback? This is currently being undertaken.<br>• Especially important that ENI gains feedback from the Trawl fisheries overlapping this site (potential trawl hazards). This is currently being undertaken. Please note as per comment above, until decommissioning of assets is undertaken subsea hazards from assets will remain unchanged. Future consultation will be undertaken during the development of decommissioning options.<br><br>Look forward to your reply to the above.<br><br>Best regards |
| | **12.03.2019 - Email response received**<br><br>Hello [redacted]<br><br>Many thanks for the email received yesterday.<br><br>Note the two attachments above. Are these new documents? Previously sent documents? There is no date on either document, without a date they have no "value" – please advise. There's also no page numbers – hard to refer back to information quoted.<br><br>Note the locations have been described in Eastings and Northings. Commercial fishing information and our supporting maps etc are all in latitudes and longitudes. Eastings and Northings are not helpful. Any information I cross-check is in lats and longs. Note your attached map is in lats and longs – this information should have been included up front. Please provide consistent information in a manner suitable for your stakeholders. It helps with relationship building, it helps with delivering a clear message!<br><br>You note fisheries which overlap this activity on one page and then note of these fisheries you have reviewed who are potentially active on another page. Then you have an attachment titled Table 3: State fisheries which includes additional fisheries which do not marry in with the information provided in your document. The information contained within your document should balance with the information in the table. It clearly doesn't.<br><br>There is also fishery information in the above documents which is substantially wrong.<br><br>State managed fisheries (those fisheries noted in the text and those fisheries in Table 3):<br>• Pilbara Trawl – unclear from your map whether Woollybutt is in the Trap only sector or if it is just in the Pilbara Trawl Zone 1 closed section<br>  ○ If it is in the closed section they are still a relevant party to this activity because the closed section is not necessarily closed permanently. Therefore, being a trawl fishery they will want to know about potential trawl hazards (potential future use). Important they are in the loop.<br>• Note for Mackerel – you should only be engaging with licence holders in Area 2 Pilbara – not all Mackerel licence holders. When you get an updated list from DPIRD (Fisheries) for mackerel make sure you ask for it to be split by the three zones. Many fishers only have a licence in one or two zones not necessarily all three zones.<br>• Specimen Shell is a wade and dive fishery – they do not dive in water depths of 100 metres. Ever.<br>• The pearl industry via the Pearl Producers Association PPA must be [redacted] ) unless Aaron has advised otherwise. They may not fish at this water depth but stock may be breeding/ emanating from deeper areas. |

- The South West Coast Salmon Fishery has never been active anywhere near the Woollybutt site. South-West Coast Salmon Managed Fishery includes all WA waters north of Cape Beaufort except Geographe Bay. It is called South-west because it is only fished in the south west. Also only in state waters and being a beach net fishery (the net goes out from the beach loops out and hauled back on to the beach), there is no way they will be operating 80 kilometres north west of Onslow at 100 metre water depth. In addition, it is a migratory specie, the annual "salmon run", rarely travelling much further north than metropolitan Perth, a freak run a couple of years ago saw a couple of fish sited near Exmouth (it made the news such a freak event). Therefore, there is no commercial fishing in the Woollybutt activity area, they do not exist in the activity area, they do not migrate through the activity area and they do not breed in the activity area. Ever.
- West Coast Rock Lobster – there is no fishing – ever – for western rock lobster in the area of this decommissioning activity. They should not have been included in the table (it unfortunately, like the above points, makes you look like you don't know what you are doing in relation to commercial fishing, we are your key / only potentially affected party at this site).

Commonwealth Managed Fisheries (those fisheries noted in the text and those fisheries in Table 3):

- There is one active licence holder in the Western Tuna and Billfish Fishery, important he is consulted.
- Southern Bluefin Tuna – no individual consultation required with licence / quota holders – there is zero fishing anywhere in WA for SBT. However, it is a very important migratory route, therefore they must be included as an important stakeholder – key contact is the Australian Southern Bluefin Tuna Industry Association ASBTIA ([redacted]).
- Western Skipjack – the AFMA site clearly states this is a fishery under review – there has been no commercial fishing since around 2010, therefore zero fishing activity in the decommissioning area.
- Northwest Slope Trawl and Western Dee[water Trawl fisheries should not have been concluded in the table (again as per the state fisheries – information within your text should "balance" with information in your table). These fisheries both operate in water depths greater than 200 metres, therefore, not ever interacting with the Woollybutt site.

The Woollybutt decommissioning activities are taking place in pre-existing exclusion zones, therefore the actual physical decommissioning activities will not directly disrupt commercial fishing. Commuting supply and support vessels etc are very important and can negatively impact - very important they keep well clear of any commercial fishing activities.

Of particular importance to commercial fishers (different fisheries have different interests) are:

- Well heads etc are FADs (fish aggregation devices).
    - It is our expectation that over time a "natural environment" has built up in and around the decommissioning site and therefore is a marine habitat for commercial fishing species.
    - Many commercial fishers operate in water depths around 100 metres – these soon-to-be-available sites are of strong interest to them.
    - We like to protect our marine habitats – this is the commercial fishing industry's chance to get (potentially productive) areas back which have been excluded from for many years.
- How much of this built up marine environment is ENI planning on leaving behind?
- Has ENI consulted with individual licence holders seeking their feedback?
- Especially important that ENI gains feedback from the Trawl fisheries overlapping this site (potential trawl hazards)

Look forward to your reply to the above.

Best regards

**11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5426.STKH.TC**)**

Refer to AFMA consultation

**01.05.2018 – Consultation letter (OPS.LT.5124.WAFIC.TC)**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.

**Background**

Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.

From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place.

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

The Woollybutt Oil Field is located in production license WA-25-L in approximately 100 m of water, 40 km west of Barrow Island, and 80 km North-West of Onslow, Western Australia (**Figure 1**).

The Field Management activities will continue to be performed on an ongoing basis using satellite monitoring and opportunistic in-field surveys.

Plug and abandonment activities will include the setting of plugs and cement barriers at specified depths in the well to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment.

Eni is preparing an Environment Plan (EP) to undertake petroleum activities within the Woollybutt Field to continue field management activities and permanently P&A up to seven wells.

Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

**Table 1: Well coordinates**

| **Confirmed wells to be plug and abandoned** | | |
|---|---|---|
| **Well** | **Easting** | **Northing** |
| Scalybutt-1ST1 (SB1) | 280,636 | 7,685,490 |
| Woollybutt-4ST1 (WB4) | 278,357 | 7,681,413 |
| Woollybutt-2A-ST3 (WB2A) | 282,241 | 7,685,527 |
| Woollybutt-1ST2 (WB1A) | 282,483 | 7,687,011 |
| **Additional wells which may be added to the program** | | |
| **Well** | **Easting** | **Northing** |
| West Barrow-1A | 283,065 | 7,688,528 |
| Woollybutt-3A2 | 278,903 | 7,679,994 |
| Woollybutt-5A3 | 277,733 | 7,676,363 |

**Timing and vessel details**

Eni is currently undertaking Field Management activities within the Woollybutt Field, operating under an in force Environment Plan, approved until 2022. During this period Eni also proposes to undertake plug and abandonment (P&A) activities, which will be included in a revision of the Environment Plan.

For the P&A campaign, Eni anticipates the MODU will be on location at each well for up to 20-30 days, the entire program will be completed within 150 days. Overall activity timing is subject to operational arrangements, and can be communicated to stakeholders upon request.

A MODU and up to three support and supply vessels will be required to undertake the activity, these have not been confirmed at the time of publication and can be communicated to interested stakeholders prior to commencement upon request.

**Environmental Management**

Eni has undertaken a risk assessment for the proposed plug and abandonment program, considering the potential environmental impact of these activities as well as ongoing Field Management activities. **Table 2** provides a summary of key identified risks or impacts, and key associated mitigation and management measures that will be implemented.

**Table 2: Environmental management**

| Potential risks and/or impacts | Mitigation and/or Management Measure |
|---|---|
| Interaction with other users;<br>Shipping, fishing, tourism and other activities | • Consultation to be conducted with key stakeholders during the development of this EP.<br>• Appropriate navigation and radio equipment available on board all project vessels in accordance with Marine Order 21 (Safety and emergency arrangements) 2016 and Marine Order 27 (Safety of navigation and radio equipment) 2016.<br>• A 500 m exclusion zone will be in effect around the MODU and wells. |
| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013. |

| | |
|---|---|
| | • Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

5. Figure 1: Location of WA-25 L with depths

Figure 2: Woollybutt Field – 500m Exclusion Zone

**12.05.15 - Consultation letter emailed**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**21.07.15 - Updated consultation letter emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

This is a slightly updated letter since Eni wrote to you in mid-June 2015. The new information in the letter is in *italic text* for your ease of reference.

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

*Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.*

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

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Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

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*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**22.07.2016 Email sent to WAFIC**

Dear [redacted]

Further to our last correspondence with WAFIC in 2015, we will be updating our Environment Plan for the Woollybutt Field and would like to re-engage with WAFIC regarding the decommissioning activities.

In the first instance, we are keen to have a brief meeting with someone from your team.

Could you please advise the best person to contact?

Many thanks,

[redacted]

[redacted]

**04.09.16 Email received from WAFIC**

Hello [redacted]

Further to your correspondence below, can you or someone from ENI please give me a call?

My numbers noted below. I am away from the office on Monday and Tuesday, best times to ring are Wednesday 7th in the afternoon or Thursday 8th in the afternoon.

Best regards

[redacted]

**06.09.2016 - Project update letter (OPS.LT.4600.WAFIC.TC) emailed and sent by post.**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.

| | |
|---|---|
| | In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed to [redacted], [redacted].<br>[redacted]<br>Yours sincerely<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| | **22.09.16 Email sent to WAFIC**<br>Hi [redacted]<br>Apologies for my late response. Yes, we are still seeking a consultation meeting.<br>Could we chat over the phone early next week?<br>Many thanks,<br>[redacted] |
| | **27.09.16 Email received from WAFIC**<br>Hello [redacted]<br>I am on leave from tomorrow, can you please recontact the week commencing Monday 10th October 2016.<br>Many thanks and best regards<br>[redacted] |
| **Westmore Seafoods (Seafresh Holdings)** | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **11.03.2019 – Updated Consultation letter emailed (**HSE.LT.5426.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |
| | **01.05.2018 – Consultation letter (OPS.LT.5125.Westmore.TC)**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is planning the decommissioning of the Woollybutt Oil Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program. Please refer to the attached consultation package.<br>**Background**<br>Eni Australia Limited (Eni) as permit holder of WA-25-L is currently undertaking Field Management activities within the Woollybutt Field, located off the North-West coast of Western Australia.<br>From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment such as flexible flowlines and subsea wells remained in place. |

This Stakeholder Consultation Package will outline the ongoing field management and proposed P&A activities of up to seven wells. The P&A activities will be completed within the field management period, which is currently operating under an in-force Environment Plan, approved until 2022.

Consultation material provided in 2015 and 2016 has kept stakeholders informed regarding the current status of the Woollybutt Field and future plans for the field. Future consultation will outline plans to decommission the equipment which remain in the Woollybutt Field.

**Activity overview**

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Activities anticipated to be undertaken as part of this EP include:

- Field monitoring on an ongoing basis using satellite monitoring and opportunistic in-field visual surveys;
- Mobilisation of Mobile Offshore Drilling Unit (MODU) to field with support vessels;
- P&A of a maximum of seven wells, see **Table 1**, with a MODU.

Decommissioning of remaining subsea equipment will be the subject of a future EP submission with an additional stakeholder period.

An exclusion zone of 500 m currently exists around the four confirmed wells to be plug and abandoned, which will be in place around the MODU and wells during the P&A activities (**Figure 2**). Please see the attached map of the WA-25-L permit location for more detail.

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**Timing and vessel details**

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| Seabed disturbance | • Designated areas for anchoring will be identified to reduce potential impacts on benthic habitats in the area. |
| Introduction of marine pest species | • All project vessels to be subject to risk assessment prior to contracting.<br>• All ballast on board project vessels will comply with Australian Ballast Water Management Requirements.<br>• All vessels to have an anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. |
| Hydrocarbon release due to:<br>Subsea release of crude, diesel release from vessel | • Appropriate spill response plans, equipment and materials will be in place and maintained.<br>• Adherence to well control procedures.<br>• Blow Out Preventers (BOP) down well and surface can be activated in the unlikely event of loss of well control<br>• MODU anchored to prevent drifting off location during P&A activity<br>• Marine diesel fuel use only.<br>• All vessels will have a SOPEP that will be implemented immediately in the event of a hydrocarbon spill.<br>• Maintenance of 500 m exclusion zone around Woollybutt infrastructure during activity as per **Figure 2**. |
| Marine fauna interactions due to:<br>Vessel collision, noise, light, atmospheric emissions | • Implementation of EPBC Regulations (Part 8) Division 8.1 (Interacting with cetaceans) to minimise the disturbance to marine fauna caused by vessel noise or strike which includes restrictions on vessel speeds and helicopter operations.<br>• Vessels will comply with Eni Marine Management policies and have an Inspection, maintenance and repair program operating to ensure engines and equipment are kept in good working order.<br>• Project vessels will comply with the requirements of Marine Order 97 (Marine pollution prevention–air pollution) 2013.<br>• Marine diesel fuel used only. |
| Discharge of small volumes of cement and completion fluids to the marine environment | • Chemical risk assessment of cement and completions fluids.<br>• Selection of low toxicity chemicals. |
| Vessel discharges and waste management | • Vessels hold a current IOPP certificate in accordance with Marine Order 91 (Marine pollution prevention–oil) 2014.<br>• Suitable spill kits in accessible locations on board to be used immediately in the event of a chemical/hydrocarbon spill.<br>• Vessel will hold a valid International Sewage Pollution Prevention (ISPP) certificate.<br>• Putrescible waste will be managed in accordance with requirements of Marine Order 95 (Marine pollution prevention–garbage) 2013. |

| | |
|---|---|
| | • Discharge of sewage will be in accordance with requirements of Marine Order 96 (Marine pollution prevention–sewage) 2013.<br>• Project vessel(s) and MODU will have a Garbage Management Plan in place which outlined procedures for handling storing, processing and disposing of garbage.<br>• All hazardous and non-hazardous wastes generated at sea during field management activities will be retained on project vessel and disposed of onshore by a licensed Waste Management Contractor (excluding putrescible waste and sewage). |

Your comment is sought in relation to any potential impact that this program may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 31 May 2018 to the contact details provided at the end of this letter.

All comments provided will be considered in the revision of Eni's Woollybutt Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).

All communications in relation to this should be directed to [redacted].

[redacted]

Yours sincerely

[redacted]

Attachments:

6. Figure 1: Location of WA-25 L with depths
7. Figure 2: Woollybutt Field – 500m Exclusion Zone

**21.07.15 - Consultation letter emailed and sent by post**

*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*

Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.

This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field.

As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.

All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.

Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.

**Field Equipment to be Decommissioned**

The following decommissioning activities will take place.

The flowlines will be disconnected from the subsea trees.

Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.

The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.

All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.

Flowlines

- The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.

Six Anchors

- Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.

Six Anchor Mooring Chains

- Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

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| | *Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Woollybutt Field - Location WA-25 L with Depths* |
| | **06.09.2016 - Project update letter (OPS.LT.4601.Westmore.TC) emailed and sent by post.**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia is revising the environment plan for the ongoing management of the Woollybutt Field. As a stakeholder with interests in this area, we wish to keep you informed of the planned decommissioning program.<br>In 2012, the field was safely shut-in. Following our last correspondence in August 2015, please note the following project updates:<br>• The field has been monitored through in-field surveys, most recently in August 2016.<br>• Wells are scheduled to be permanently plugged in 2018.<br>• The field will be monitored on an ongoing basis using satellite monitoring and opportunistic in-field surveys until wells are permanently plugged.<br>• The 500 m petroleum safety zone around the field remains in place.<br>Your comment is sought in relation to any potential impact that this program might have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 28 September 2016 to the contact details provided at the end of this letter. All comments provided will be considered in the revision of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA).<br>All communications in relation to this should be directed to [redacted].<br>[redacted]<br>Yours sincerely<br>[redacted]<br>*Attachments:*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field - 500m Exclusion Zone*<br>*Wollybutt Field - Location WA-25 L with Depths* |
| **SBFTIA** | **11.03.2019 – Updated Consultation letter mailed (**HSE.LT.5427.STKH.TC**)**<br>Refer to AFMA consultation for full letter content |
| **Mackerel Managed Fishery (49 Licences)** | **25.09.2020 –Consultation letter mailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content. |
| | **04.04.2019 –Consultation letter mailed (**HSE.LT.5427.STKH.TC**) including cover letter**<br>Refer to AFMA consultation for full letter content. |
| **Onslow Prawn Fishery (30 Licenses)**<br><br>**Pilbara Trawl Fishery (11 Licenses)** | **13.08.15 – Consultation notice sent to license holder**<br>*Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni*<br>Eni Australia Limited (Eni) is operator of the Woollybutt Oil Field located off the north-west coast of Western Australia. From 2003 to 2012, oil produced from the field was delivered via subsea wells to a Floating Production, Storage and Offloading (FPSO) vessel, from which tankers collected and transported oil to the market. Following the cessation of production in 2012, the FPSO vessel left the field while the associated production equipment remained in place.<br>This letter advises you about the proposed plan to decommission the equipment which remains in the Woollybutt Field. |

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| **Pilbara Line Fishery (7 Licenses)**<br><br>**and**<br><br>**Pilbara Trap Fishery (6 Licenses)** | As a stakeholder with interests in this area, you are invited to review the planned decommissioning program. Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities.<br><br>All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).<br><br>NOPSEMA will assess Eni's Decommissioning Environment Plan in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGSA). The OPGGSA requires Eni to conduct consultation with stakeholders as part of the environmental risk assessment process for decommissioning. The decommissioning activities in the field cannot commence until NOPSEMA approves Eni's Decommissioning Environment Plan.<br><br>Our consultation with you forms part of this environmental assessment process and so Eni will report on the consultation in an appendix to the Decommissioning Environment Plan for NOPSEMA.<br><br>**Location and History of the Field**<br><br>The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40km west of Barrow Island, and 80km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field (see enclosed map). The field lies in approximately 100m water depth.<br><br>During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.<br><br>The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35m, before the FPSO departed the field in early June 2012.<br><br>An exclusion zone of 500m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning has been completed. Please see the attached map of exclusion zones for more detail.<br><br>**Field Equipment to be Decommissioned**<br><br>The following decommissioning activities will take place.<br>The flowlines will be disconnected from the subsea trees.<br>Ten wells will be decommissioned using industry best practice which is known as the 'plugging and abandonment technique'. Some of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 metres above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a rectangular shape of approximately 6m by 5m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity. The plugging and abandoning of the well will follow Australian and international best practice standards.<br>The flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be left on the sea floor. The following pages provide further information about this.<br>All the remaining equipment (DSPM, mid-depth buoys, flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets and termination units will be retrieved. To remove the equipment, Eni will use either a single dynamically positioned multifunction support vessel with a supply vessel or a construction barge, two anchor handling tugs and a supply vessel. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.<br><br>Table 1 on the following page outlines how each piece of equipment would be left on the sea floor.<br>Flowlines<br>• The flowlines are either buried or partially buried in the seabed with marine growth evident on the surface of the flowlines. They provide local habitat and are contributing to marine life in what is an otherwise barren area.<br><br>Six Anchors<br>• Each anchor is 8.1m long x 2.9m wide and 3.1m high. The anchors are completely buried below the seabed.<br><br>Six Anchor Mooring Chains<br>• Each chain has an approximate length of 835m and weight of 215t. The chain link diameter ranges from 92mm to 162mm. The chains are currently suspended but, once disconnected from the DSPM, will be laid on the seabed within a circular area radiating from the DSPM position with a |

radius of no more than the length of each chain (Figure 1). It is anticipated that the chains will also attract marine life.

Two Mid Depth Gravity Bases

- These items are a rectangular shape. They have a seabed footprint of 7m x 10m each and a low side profile (0.8m). They are lying on the sea floor and are partially embedded. They protrude approximately 0.5m above the seabed. These are already in place and will not be shifted during decommissioning. Both gravity bases lie approximately 80 meters from the coordinates of the previous FPSO position.

Umbilicals

- Approximately 16km of umbilical cables are lying on the seabed. They are either buried or partially buried on the sea floor and range from roughly one to six inches in diameter.

Subsea Trees

- 4 subsea trees will be left on the seafloor. Each tree is approximately 5m wide by 6m high by 6m deep.

Wellheads

- 6 Wellheads will be left on the seafloor. Each wellhead is elevated above the seafloor by approximately 3m and is 24 inches in diameter.

*Attachments*

*Woollybutt Field - Coordinates for anchors, mid depth gravity bases, previous FPSO position*

*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases following decommissioning*

*Woollybutt Field - Coordinates of the Licence Area WA 25-L*

*Woollybutt Field - 500m Exclusion Zone*

*Woollybutt Field - Location WA-25 L with Depths*

**01.08.2016 – Letter and consultation notice sent to license holder**

Dear Sir/Madam

**Woollybutt Oil Field Decommissioning Project – Invitation to Consult with Eni**

Eni Australia is planning the decommissioning of the Woollybutt Field. As a Commercial Fishing Licence Holder with interests in this area, we wish to keep you informed of the planned decommissioning program.

Following our last correspondence in August 2015, please note the following project updates:

- Well 'plug and abandonment' will be prioritised and undertaken in 2018.
- Following completion of plug and abandonment, the DSPM and mid-depth buoys will be retrieved and remaining seafloor infrastructure will be subject to further engineering and environmental assessment.
- The field will be monitored on an ongoing basis using satellite monitoring and periodic in-field visual surveys until plug and abandonment activities are complete.

Details of the project activities are provided in the attached notice.

Your comment is sought in relation to any potential impact that the decommissioning works might have on your functions, interests or activities. Please provide feedback by 24 August 2016 to the contact details provided below. Should you not have any comment, we would be grateful if you could respond as such. All comments provided will be considered in the development of Eni's Decommissioning Environment Plan to be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in accordance with the *Offshore Petroleum and Greenhouse Gas Storage Act* (OPGGSA).

All communications in relation to this should be directed to [redacted], [redacted].

[redacted]

Yours sincerely

[redacted]

**Notice to Commercial Fishing Licence Holders**

**Woollybutt Oil Field Decommissioning Project**

**Invitation to Comment**

**Location and History of the Field**

The Woollybutt Oil Field is located in Commonwealth marine waters on the North-West Shelf approximately 40 km west of Barrow Island, and 80 km north-north-west of Onslow, Western Australia. Eni is the holder of Petroleum Licence WA-25-L which includes the Woollybutt Field. The field lies in approximately 100 m water depth.

During production, the field produced oil from four subsea wells tied back through a flowline system, to the Four Rainbow FPSO vessel connected to a Disconnectable Single Point Mooring (DSPM) buoy. Periodically, a shuttle tanker was used to offload the FPSO and transport the oil to market.

The oilfield was in production from 2003 to May 2012. Following the end of production the FPSO was disconnected from the DSPM, and the DSPM was then lowered to a depth of approximately 35 m, before the FPSO departed the field in early June 2012.

An exclusion zone of 500 m has been in place in the field since the Woollybutt project commenced and will remain in place until decommissioning is complete.

**Decommissioning activities**

The following decommissioning activities will take place.

- Plug and abandonment: Ten wells will be decommissioned using industry best practices and in compliance with Australian regulatory requirements. Six of these wells have already been permanently abandoned using this technique. Following decommissioning, six of the wells will protrude approximately 3 m above the seabed. The remaining four wells will have a Horizontal Xmas Tree (HXT) attached to them. The HXT protrudes approximately 6 m above the seabed. The wellheads are of a cylindrical shape and approximately 24 inches in diameter, the HXT are of a cubic shape of approximately 6 m by 4 m by 4 m. The well operation required to permanently abandon the wells will involve the use of a drill rig/vessel for approximately 100 to 160 days. The rig/vessel will comply with Australian maritime laws and will be covered by a separate environment plan for the activity.

- Equipment retrieval: DSPM and mid-depth buoys, will be retrieved. To remove the equipment, Eni will use a single dynamically positioned marine support vessel with an anchor handler tug. The removal operation could take up to 10 days to complete, depending on weather and other operational constraints. This activity will comply with relevant Australian maritime laws including MARPOL 73/78.

- Remaining seafloor infrastructure: The removal of flowline transition guide bases, anode skids, manifolds, control distribution units, subsea umbilical baskets, termination units, flowlines, umbilicals, anchors, anchor chains, Horizontal Xmas Trees, wellheads and gravity bases will be further assessed and decommissioned with consideration for maximising the net environmental benefit. The following pages provide further information about this.

**Seafloor infrastructure**

Table 1 provides a description of the seafloor infrastructure. A comparative assessment of key decision factors including environmental and societal impact, safety, energy use and legal liabilities, supports the decision to leave in situ. As does a growing body of independent scientific research which highlights the role that submerged structures can play in maintaining marine life and connectivity conservation between discrete marine ecosystems.

Geophysical investigations of the seafloor have shown surficial sediments to comprise easily disturbed soft to very soft silts and fine sand (up to 5 m in depth). In August 2014, Eni undertook a visual survey of the infrastructure, which confirmed that over 50% of the flowlines are buried with the remainder partially buried in the seabed. Given the nature of the seabed, Eni expects the flowlines and umbilicals to become completely buried over time.

Whilst the horizontal Xmas Trees, well head protrusions and mid depth buoy gravity bases protrude from the seabed, visual observations from the ROV survey found that these structures, after 10 years in the field, have formed artificial reef structures supporting considerable marine life. As mentioned above and assuming no detrimental effect to the fishing industry, Eni is of the opinion that there is benefit in leaving the structures in situ for conservation and continued development of marine life.

**Decommissioning Timing**

Eni is planning to start well plug and abandonment in the field in 2018, subject to regulatory approvals and vessel availability. This activity is likely to take a minimum of four months.

Eni will provide a further update prior to the commencement of well plug and abandonment.

**Communication**

Please direct all communications in relation to this notification to [redacted], [redacted].

[redacted]

| | |
|---|---|
| | [redacted]<br><br>*Attachments:*<br>*Woollybutt Field - Location WA-25 L with Depths*<br>*Woollybutt Field - Coordinates of the Licence Area WA 25-L*<br>*Woollybutt Field – Coordinates for anchors, mid depth gravity bases and FPSO*<br>*Woollybutt Field – Diagram of location of anchors, anchor chains and gravity bases*<br>*Woollybutt Field – Details of seafloor infrastructure* |
| **Commonwealth Western Tuna and Billfish Fishery – Permit Holder (1 licence holder)** | **25.09.2020 –Consultation letter emailed (OPS.LT.6230.SD)**<br>Refer to AFMA consultation for full letter content.<br><br>**26.03.2019 – Updated Consultation letter emailed (**HSE.LT.5415.STKH.TC**)**<br>Refer to AFMA consultation for full letter content. |
| **Chevron** | **28.05.2021 – Consultation letter emailed (OPS.LT.6457.SD)** |

**Stakeholder Consultation**

## Woollybutt Field – Stakeholder Consultation

Eni Australia Limited (Eni) is currently undertaking ongoing field management activities within the Woollybutt field, located in Production Licence WA-25-L within Commonwealth waters. Woollybutt production ceased in 2012 and all associated subsea equipment remains in the Woollybutt field and within a 500 m Petroleum Safety Zone (PSZ).

Eni has an Environment Plan (EP) in place for the current ongoing field management activities, which was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in 2019.

Eni is submitting a revised EP to NOPSEMA for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (the regulations) to reflect the current status of the subsea field infrastructure, the proposed plug and abandonment (P&A) activities and the proposed recovery of certain subsea production equipment.

This consultation bulletin provides an update on ongoing field management, field status and proposed P&A and equipment recovery activities. Due to the presence of the Wheatstone trunkline in WA-25-L, Chevron has been identified as a potential stakeholder to the Woollybutt field activities. Whilst Eni notes that it is not referenced as a relevant stakeholder in the current Wheatstone EP and was not consulted as such, we hereby inform you of the activities in the Woollybutt field. Eni will continue to engage in relation to operational and emergency arrangements for ongoing operations in WA-25-L.

**Location**

The Woollybutt field is located in production license WA-25-L in approximately 100 m of water, 65 km north of Onslow and 35 km west of Barrow Island (**Attachment 1**) within Commonwealth waters. A summary of the key field infrastructure, locations and status are provided in **Table 1**.

The Woollybutt field subsea infrastructure are marked on nautical charts surrounded by a 500 m Petroleum Safety Zone (PSZ), which excludes other marine users from the area (**Attachment 2**).

**Table 1: Summary of the Key Woollybutt Infrastructure**

| Infrastructure | Longitude | Latitude | Status |
|---|---|---|---|
| Scallybutt-1 well (SB1) | 114 53.447 | -20 55.078 | Shut-in production wells to be P&A. |
| Woollybutt-4 well (WB4) | 114 52.102 | -20 53.27 | |
| Woollybutt-2A well (WB2A) | 114 54.373 | -20 55.069 | |

| | | | |
|---|---|---|---|
| Woollybutt-1 well (WB1) | 114 54.524 | -20 54.266 | |
| Woollybutt-3A (WB3A) | 114 52.406 | -20 58.043 | Suspended wells – may be included in P&A campaign. |
| Woollybutt-5A (WB5A) | 114 51.703 | -21 00.000 | |
| Woollybutt-6H (WB6H) | -20.974306 | -20.974306 | |
| Corkybark-1 (CB1) | 114.97368 | -20.89287 | Abandoned with PGB & WH (no posts) – will be left insitu |
| Disconnectable Single Point Mooring (DSPM) | 114 54.441 | -20 54.599 | The DSPM is currently located on the seabed, located within the 500 m PSZ. |

**Activities**

The revised EP includes activities relating to the field management, well plug and abandonment (P&A) activities and recovery of certain subsea production equipment.

Activities undertaken as part of the scope of the revised EP are presented in **Table 2**.

**Table 2: Summary of Activities**

| Activity | Summary | Frequency and duration |
|---|---|---|
| Field Management | Use of remotely operated vehicles (ROV) deployed from a vessel to perform field management scopes, including:<br>• Cathodic Protection (CP) surveys;<br>• General Visual Inspections (GVI);<br>• Inspection, monitoring, maintenance and repair (IMMR). | On an ongoing basis, as per the Eni Integrity Management Plan (IMP) strategy. Typically undertaken in 7-14 days. |
| P&A | Mobilisation of an Intervention Vessel (IV) to the field with integrated services to perform well P&A on four to six wells. Logistical support is provided by up to three offshore support vessels and helicopter services.<br>Well P&A activities will include the setting of plugs and cement barriers at specified depths in the wells to act as permanent barriers to eliminate the possibility of potential hydrocarbon exposure to the environment. Following plugging, wellheads will be cut at the seabed and retrieved. | Target execution window is 4Q 2021[1]. It is anticipated P&A of each well will take approximately 10-20 days. |
| Recovery of subsea production equipment | The recovery of subsea production equipment will be undertaken using the IV and support vessels. The following equipment is proposed to be recovered from the field and taken to shore for disposal, recycling or reuse, in accordance with applicable legislation:<br>• Gravity bases;<br>• Disconnectable Single Point Mooring;<br>• Subsea structures (including manifolds and umbilical termination assemblies).<br>During the activity, anchors, chains, flowlines and umbilicals will be disconnected, and remain in situ until future decommissioning. | Removal of DSPM and listed subsea structures to follow the P&A campaign[1] and anticipated to take approximately 20-30 days. |

| | | |
|---|---|---|
| Abandonment of Corkybark-1 wellhead | Corkybark-1 (CB1) is an abandoned well with a guide base remaining. The well was drilled in 2000 to a depth of 572m where the hole was lost after the drill pipe became stuck and could not be recovered. It was abandoned as a dry well in accordance with Designated Authority approval.<br>The guideposts were removed from the wellhead guide base. The total structure extends approximately 1.3 m above the seabed.<br>A decommissioning options assessment has been conducted and determined the leave in-situ option provides an equal or better outcome to full removal. Therefore, the Corkybark-1 wellhead and PGB will be left in-situ as is. | Following approval under the Sea Dumping Act 1981. |

Note 1: subject to project variables including but not limited to vessel availability, regulatory approvals and weather.

**Environmental Management**

Eni assessed the environmental risk assessment for the ongoing field management, proposed P&A activities and removal of subsea production equipment, giving consideration to activity timing, durations, location and potential environmental impacts. Management measures will be implemented to reduce the impacts and risks to as low as reasonably practicable and to an acceptable level.

**Table 3** provides a summary of potential key environmental risk and/or impacts and associated management measures identified.

**Table 3: Potential Key Environmental Risks and Management Measures**

| Environmental Risk and/or Impact | Risk Description | Mitigation and/or Management Measure |
|---|---|---|
| Interaction with other users – vessels and subsea equipment | Presence of vessels and the 500 m PSZ in the field may exclude other marine users from the area. | Eni will notify regulatory authorities and marine users on the activities as required. |
| Interaction with other users – Corkybark-1 | Continued presence of Corkybark-1 could present a snag hazard for fishing gear | Risk assessment has determined the snag risk to be low.<br>Corkybark-1 wellhead will be marked on nautical charts. |
| Routine marine discharges | Vessels will discharge water, cooling water and sewage/grey water to the marine environment. | All routine marine discharges will be managed according to legislative requirements. |
| Chemical use / discharge | Minor quantities of chemicals will be released to the marine environment during field management, P&A and recovery of subsea equipment. | Chemical use will be managed in accordance with an environmental selection process. |
| Seabed disturbance | Removal of subsea infrastructure will disturb the area in which the equipment was once placed. | Procedures will be followed to limit seabed disturbance during recovery of subsea equipment. |
| Floating mid-depth buoy interaction with other users | Movement of the floating mid-depth buoy outside of the 500 m PSZ could present a navigational hazard to other users. | The floating mid-depth buoy is under 24-hour surveillance and will be removed and disposed of onshore in accordance with legislative requirements. |
| Marine fauna interaction | Vessels used for the activities have the potential to interact with marine fauna (e.g. collisions). | Measures will be taken to protect marine fauna from vessel activities. |

| | | |
|---|---|---|
| Loss of containment | Loss of containment of hydrocarbons to the marine environment may occur during refuelling at sea or in the event of a vessel collision or a loss of well control / well leak. | Appropriate fuel transfer procedures and equipment will be used to prevent spills<br>Procedures to reduce the potential for uncontrolled hydrocarbon releases will be followed.<br>Response plans and equipment will be in place and maintained to manage spills to the environment. |
| Introduction of marine pest species | Introduction and establishment of invasive marine pests to the area via vessels ballast water or biofouling on vessel hulls. | All vessels will be assessed and managed as appropriate to prevent the introduction of marine pests.<br>Vessels will comply with biosecurity requirements. |

**Future Decommissioning**

Decommissioning of the remaining Woollybutt field subsea components (anchors, chains, four non-production well heads, flowlines and umbilicals) will be subject of a separate EP. Until decommissioning, field management will be ongoing to maintain remaining components in accordance with Section 572 of the Offshore Petroleum and Greenhouse Gas Storage Act (OPGGS Act). Remaining flowlines range from 2½" to 6" in diameter and approximately 20 km in total length, and umbilicals are 3½" in diameter and approximately 8 km in total length.

A comparative assessment process has been undertaken to evaluate a range of decommissioning options for the remaining components, including complete removal, partial removal and leave insitu. Options were assessed with respect to technical, health and safety, environmental, economic and socioeconomic risks. The assessment has determined that leaving the remaining components insitu would provide the best overall outcome. In particular, the equipment would continue to provide hard substrate for marine habitat growth on an otherwise featureless seabed.

Studies are ongoing and stakeholder feedback will be taken into consideration.

**Stakeholder Comment and Feedback**

Your comment is sought in relation to any potential impact that the ongoing field management, proposed well P&A activities and recovery of subsea production equipment may have on your functions, interests or activities. If you wish to provide any feedback on these activities, please do so by 25 June 2021 to the contact details provided below.

Eni also seeks any comment from stakeholders regarding insitu decommissioning of remaining subsea components, and whether they would like to continue to be consulted in these matters as the decommissioning EP is developed.

All comments provided will be considered in the respective revision of Eni's Woollybutt EP to be submitted to NOPSEMA, in accordance with the OPGGS Act.

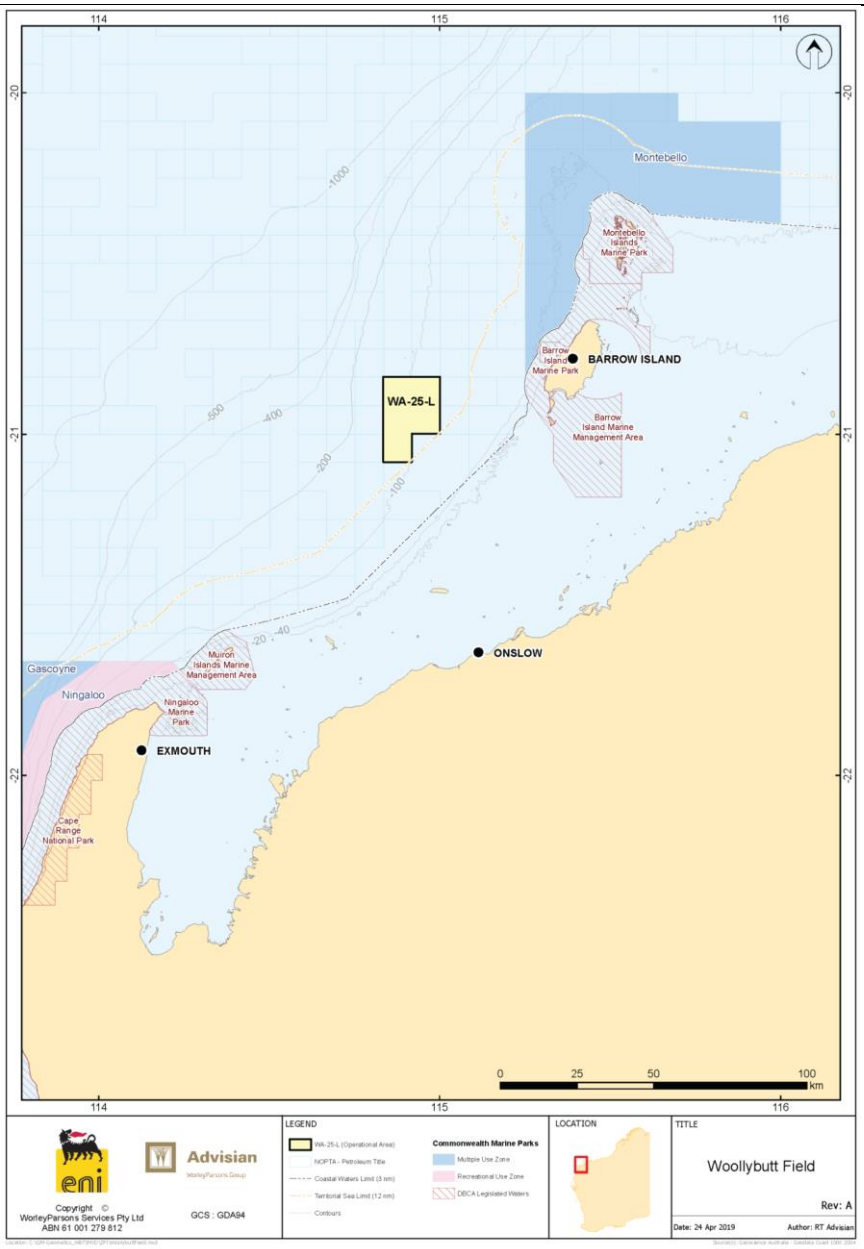
All communications in relation to this should be directed to:

Email: info@eniaustralia.com.au

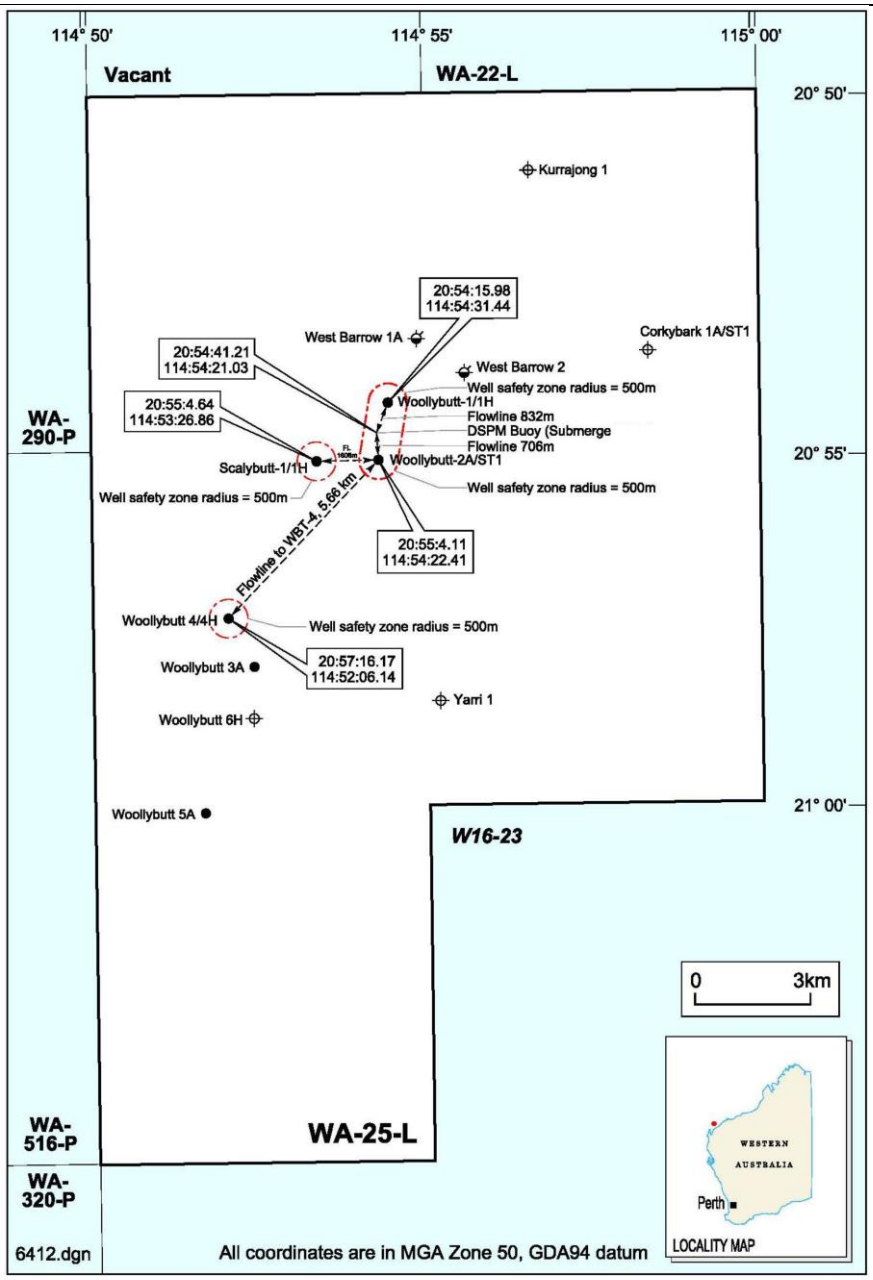
Post: PO Box 6862

East Perth WA 6892

Phone: (08) 9320 1132




**Attachment 1: Location of WA-25 L**




**Attachment 2: Woollybutt Field 500m Petroleum Safety Zone**

# APPENDIX E:

# WEATHERING AND DISPERSIBILITY OF WOOLLYBUTT OIL REPORT

# LABORATORY SCALE WEATHERING AND DISPERSABILITY OF OIL

PROFESSIONAL OPINION

Prepared by:
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Prepared for:
AGIP Australia

November 2002

ENV 02-228

GEOTECH
GEOTECHNICAL SERVICES PTY LTD

## EXECUTIVE SUMMARY

On 26th September 2002 five pressurised sample bombs, four containing oil and one (a blank) containing water, were received by Geotechnical Services. These were opened on 3rd October 2002, by Oil Phase.

A portion of the collected oil was weathered in a laboratory scale test on a water column designed to simulate conditions on the North West Shelf (NWS). Sub-samples of the weathered oil were taken at predetermined times and these were analysed to determine the fate of the hydrocarbons. Sub-samples of the associated water were also analysed to determine if the water would be harmful to marine species.

A second portion of the collected oil was dispersed with Corexit 9527 in a laboratory scale test on a water column designed to simulate conditions on the North West Shelf (NWS). Sub-samples of the water column were taken at predetermined times, however the Corexit 9527 present in the sample made it extremely difficult to analyse by conventional methods. Subsequently the test was repeated and sub samples of the oil were analysed by gas chromatography mass spectrometry to monitor the fate of the hydrocarbons.

Details of the experimental procedure used to determinate the effects of the laboratory scale experiments are given in the Methodology section of this report.

Summaries of the results of the weathering and dispersability tests relative to the starting material are given in Tables 1 and 2 below.

**Table 1:** Summarised Results of Laboratory Weathering and Ecotoxic Tests

| Weathering and Ecotoxic | | | |
|---|---|---|---|
| **Time Sample Taken** | **Effect of Weathering on Oil** | **Hydrocarbons in the Water (mg/L)** | **Microtox Results** |
| **15 mins** | No Effect | ND | Non Toxic |
| **30 mins** | No Effect | ND | Non Toxic |
| **1 Hour** | No Effect | 0.5 | Non Toxic |
| **4 Hours** | Very Slight Loss of Some Volatile Components | ND | Non Toxic |
| **8 Hours** | Loss of Some Volatile Components | 2 | Mildly Toxic |
| **24 Hours** | Loss of Some Volatile Components | 9 | Mildly Toxic |

**Table 2:** Summarised Results of Laboratory Dispersability Tests

| Dispersability | | | |
|---|---|---|---|
| **Time Sample Taken** | **Effect of Weathering on Oil** | **Effect of Dispersant on Oil** | **Hydrocarbons in the Water (mg/L)** |
| **15 mins** | No Effect | No Effect | ND |
| **30 mins** | No Effect | No Effect | ND |
| **1 Hour** | No Effect | No Effect | ND |
| **4 Hours** | Very Slight Loss of Some Volatile Components | No Effect | <10 |
| **8 Hours** | Loss of Some Volatile Components | No Effect | <10 |
| **24 Hours** | Loss of Some Volatile Components | No Effect | ND |

ND Not Determined

## Introduction

Five pressurised sample bombs, , were received at Geotechnical Services on 26th September 2002, four of these contained oil and were labelled:

DST 1.03, 7258-MA, WHS/diphasic WH/Data Header
DST 1.05, 7279-MA, WHS/diphasic WH/Data Header
DST 1.06, 7276-MA, WHS/diphasic WH/Data Header
DST 1.07, 7271-MA, WHS/diphasic WH/Data Header and

The remaining sample bomb contained water only and was labelled:

DST1.01, Water 4768-EA, Distilled Water

This water sample was to act as a blank for the suite of analyses if anomalous results were obtained eg if contamination was suspected. Yagan Bibby from Oil Phase opened these sample bombs at Geotechnical Services premises on 3rd October 2002. 100 mL of each oil was combined in a fifth container and tested to determine the fate of the hydrocarbons from this oil during a laboratory scale experiments.

Weathering: Previous experiments, most notably Kagi et. al., (1988), have shown that thin films of Australian light crudes or condensates released onto NWS waters are dispersed rapidly by evaporation and spreading. In this series of tests the fate of the hydrocarbons in a thick film were determined using a worst case scenario (film thickness of 5 mm with mild weather conditions).

Dispersability: In this series of tests the fate of the hydrocarbons in a thick film were determined. Conditions were the same as for the weathering experiment, except that 1mL of Corexit 9527 in 5mL of deionised water was added to 125 mL of oil immediately after it was bought into contact with the water column.

## Methodology

*Materials*

Great care was taken to avoid contamination. All utensils and containers were scrupulously cleaned and glassware was heated to 600°C in an annealing oven.

*Weathering*

The following conditions were used to "weather" the oil:

| | |
|---|---|
| Volume of Water | 4L |
| Diameter of Container | 18 cm |
| Surface Water Temperature | 24ºC |
| Mixing | A 2 cm vortex was apparent (magnetic stirrer used) |
| Film Thickness | 5 mm (120 mL of Oil) |

Sub-samples of the oil and the water were taken at 15 minutes, 30 minutes, 1 hour, 4 hours and 8 hours all using the conditions described above. The oil was then left to sit overnight (16 hours) with no heating and no mixing, a final sub-sample was taken 24 hours after the experiment began.

Each of the oil sub-samples was analysed by whole oil gas chromatography mass spectrometry (GC-MS) and each of the water samples was tested with a Microtox analyser. The water sample taken at 8 hours was also submitted for algal bioassay. Two additional water samples, one taken at 1 hour and the other at 8 hours, were analysed by Purge and Trap GC-MS to determine which organic compounds had mixed with the water.

*Dispersability*

The following conditions were used to “disperse” the oil:

| | |
|---|---|
| Volume of Water | 4L |
| Volume of CoreExit | 1mL in 5mL deionised water<br>(Recommended at 1mL per 125mL of oil) |
| Diameter of Container | 18 cm |
| Surface Water Temperature | 26ºC |
| Mixing | A 2 cm vortex was apparent (magnetic stirrer used) |
| Film Thickness | 5 mm (120 mL of Oil) |

Sub-samples of the oil and the water were taken at 15 minutes, 30 minutes, 1 hour, 4 hours and 8 hours all using the conditions described above. The oil was then left to sit overnight (16 hours) with no heating and no mixing, a final sub-sample was taken 24 hours after the experiment began.

Purge and trap (P and T) gas chromatography mass spectrometry (GC-MS) was attempted on each of the sub-samples of water collected from the water column. Each of the oil sub-samples was analysed by whole oil GC-MS.

*Other Tests*

An additional experiment was carried out involving dispersing 100 mL of the oil on a 4L water column using 10 mL (neat) of Corexit 9527.

## Results and Discussion:

### *Weathering*

*Whole Oil Analysis*

The relative abundance of each hydrocarbon in the oil at Time 0 is given in Appendix A. Relative to the analysis of the oil at Time 0, there was no appreciable loss of any hydrocarbons apart from propane and isobutane in the 15 and 30 minute and 1 hour samples. There was a loss of other volatile components (isopentane, pentane, the methylpentanes, dimethylbutanes and hexane) in the 4, 8 and 24 hour samples. This result is not unexpected, as the volatile components make up a significant proportion of the oil and it will take some time (a few hours) for these to be removed. Three total ion chromatograms (TICs) have been included in Appendix B to show the similarity of each oil sample after "weathering". They are the oil at Time 0, the oil remaining after 1 hour of "weathering" and the oil remaining after 8 hours of "weathering". Appendix C shows the 3 to 10 minute section of the same three sample TICs to highlight the loss of the light ends. The loss of hydrocarbons is difficult to quantify but it appears that less than 1% of the material from this thick film appears to have evaporated after 24 hours.

Thin films have been shown to evaporate much more quickly than the five mm film used here. Kagi et. al. (1988) have noticed that real rates of evaporation of oil spills tend to be faster than laboratory predictions indicate. This is mainly due to the temperature of the water and the low viscosity of the oils. The low viscosity allows for rapid spreading of the oil on the water to form a thin layer a few microns thick. The relatively warm temperature of the water then allows for a rapid heat exchange and the more volatile (up to n-$C_{15}$) components evaporate rapidly. Pentane (n-$C_5$) has a half life of 3 mins and n-$C_{15}$ has a half life of less than 10 hours. This is important because the compounds that elute between n-$C_5$ and n-$C_{15}$ comprise the more toxic material in petroleum.

*Purge and Trap GC-MS Analysis*

There was an increase in the number of hydrocarbons detected in the water as the mixing time increased. Aromatic hydrocarbons, which are more water soluble than the saturated hydrocarbons, comprised almost all of the hydrocarbons detected in the water. The abundance of some of these is shown in Table 3. After 24 hours of contact approximately 0.1 % of the oil added to the water column had mixed with the water.

**Table 3:** Amount of Selected Hydrocarbons in Water Column during "Weathering" Tests:

| **Compound** | **1 hour (μg/L)** | **8 Hours (μg/L)** | **24 Hours (μg/L)** |
|---|---|---|---|
| Benzene | 400 | 1700 | 3800 |
| Toluene | 55 | 520 | 2100 |
| Ethylbenzene | 7 | 8 | 740 |
| 1,3-xylene | 10 | 29 | 2300 |
| Ethynylbenzene | 7 | 7 | < 2 |
| 1,2-xylene | 8 | 10 | 130 |
| Styrene | 7 | 7 | 87 |
| 1,3,5-trimethylbenzene | 8 | 13 | 75 |
| 2-methylnaphthalene | 27 | 28 | 29 |
| 1-methylnaphthalene | < 2 | 2 | 25 |
| Total | 530 | 2300 | 9200 |

**Microtox of Water from Weathered Samples:**

The results of the Microtox and Algal tests are given in Tables 4 and 5 below.

**Table 4:** Microtox Results of Water Column during "Weathering" Tests:

| *Sample Number* | EC50 % (95% Confidence Limits) | LOEC % | NOEC % |
|---|---|---|---|
| 15 minutes | Non Toxic | 90 | 45 |
| 30 minutes | Non Toxic | 90 | 45 |
| 1 hour | Non Toxic | 90 | 45 |
| 4 hours | Non Toxic | 45 | 22.5 |
| 8 hours | 33.6% (17 – 31) | 11.25 | 5.6 |
| 24 hours | 22.7% (17 – 29) | 5.6 | NA |

NA Not Applicable

LOEC (lowest observed effect concentration)

NOEC (no observed effect concentration)

**Table 5** Algal Bioassay of Water Column (Time = 8 hours) during "Weathering" Tests:

| *Sample Number* | EC50 % (95% Confidence Limits) | LOEC % | NOEC % |
|---|---|---|---|
| 8 Hours | Non Toxic | 41.3 | 20.6 |

All phenol standards were within quality control limits.

The Microtox results show that the toxicity of the water soluble fraction from the weathering experiments increased over time. There was no toxicity detected until 8 hours of mixing. A 24 hour sample was tested which showed an increase in toxicity, but this is less than expected due to a lack of mixing overnight. The 8 hour sample showed a toxicity of 33% which is moderately toxic as is the toxicity of the 24 hour sample. The algal test on the sample taken at 8 hours showed no toxicity over the 24 hour test period.

The NOEC can be used to calculate the dilution required to ensure no adverse effects on receiving organisms.

Please note that the LOEC and NOEC are functions of the concentrations tested.

**Dispersability**

Whole Oil Analysis:

Whole oil analysis from the dispersability experiment gave similar results to the weathering experiment. There was no appreciable loss of any hydrocarbons apart from propane and isobutane in the 15 and 30 minute and 1 hour samples. There was a loss of other volatile components (isopentane, pentane, the methylpentanes, dimethylbutanes and hexane) in the 4, 8 and 24 hour samples. Three total ion chromatograms (TICs) have been included in Appendix D to show the similarity of each oil sample after Corexit was added to the oil. They are the oil at Time 0, the oil remaining after 1 hour of "dispersing" and the oil remaining after 8 hours of "dispersing". The loss of hydrocarbons due to either weathering or mixing with the water column is difficult to quantify but again it appears that less than 1% of the material from this thick film appears to have evaporated after 24 hours.

*Purge and Trap GC-MS Analysis*

It was very difficult to analyse the water from the dispersability tests. The samples continually frothed and bubbled, preventing the analytes being introduced into the instrument. It was only possible to analyse very small amounts of the samples (200-300uL). These analyses will have a much higher detection limit than conventional P and T, however the amount of hydrocarbons detected in the 4 and 8 hour samples was less than 10mg/L.

*Other Tests*

Due to these inconclusive results an additional experiment was carried out involving dispersing 100mL of the oil on a 4L water column using 10mL of Corexit 9527. Immediately upon addition of the Corexit to the oil the water became cloudy. After an hour of stirring the oil slick was depleted by approximately 10 % (15 mL of oil from the original 120 mL). We are unsure as to whether this indicates that the water column was effectively saturated with hydrocarbons and was unable to absorb any more material or wether this is the amount of hydrocarbons that the Corexit 9527 will "Disperse".

## Conclusions

*Weathering*

The Purge and Trap analysis showed that approximately 0.1 % of the hydrocarbons from the oil film, mixed with the water after 24 hours of contact. The Microtox analysis indicated that the water is only slightly toxic after eight hours of mixing. The algal test of the water taken at 8 hours showed no toxicity over the 24 hour test period.

There was some evaporation of the very volatile material from the thick oil layer. This evaporation would be expected to be significantly greater if a thin film was tested.

Dispersability

Based on the results from the purge and trap, and whole oil analyses, after the addition of Corexit 9527, the dispersant has not had a significant effect on the oil. However, from the additional experiment where 10 mL of Corexit 9527 was mixed with 100 mL of oil there does appear to be a depletion of the oil slick. This loss of oil is unlikely to be due to evaporation.

## References

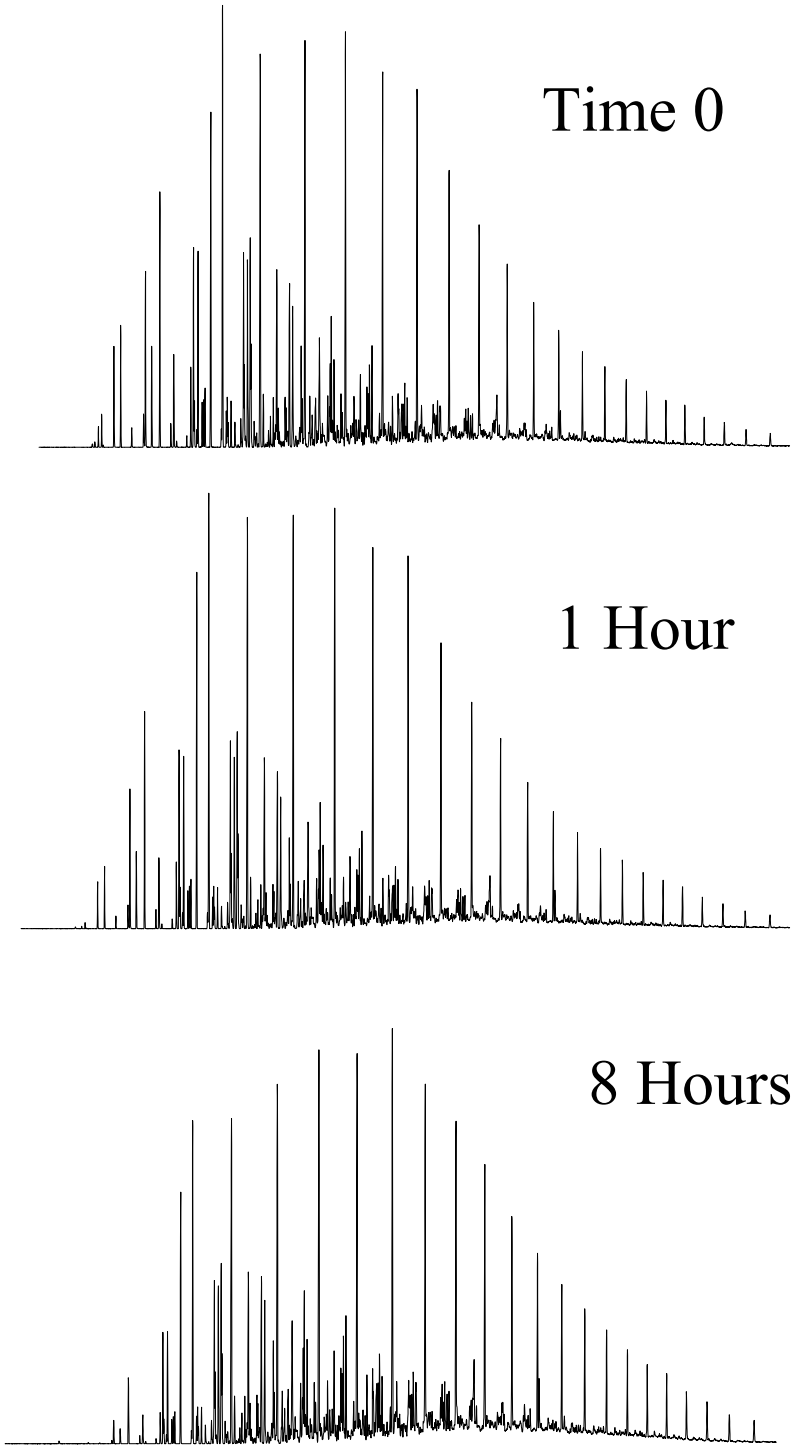
Kagi, R.I., Fisher S. J. & Alexander, R., 1988. Behaviour of Petroleum in Northern Australian Waters.: P. Purcell (Ed), Proceedings of the North West Symposium Perth, W.A. 633-642.

**APPENDIX A:** Table 5 Relative Abundance of Hydrocarbons in Mixed Oil (Time 0). These results do not imply an absolute abundance.

| Compound | Retention Time | % Match | Relative % Area |
|---|---|---|---|
| Isobutane | 3.84 | 86 | 0.2 |
| Butane (n-C4) | 4.04 | 97 | 0.3 |
| Isopentane | 4.80 | 97 | 1.0 |
| Pentane (nC-5) | 5.22 | 90 | 1.1 |
| Pentane, 2-methyl- | 6.76 | 91 | 1.8 |
| Hexane (n-C6) | 7.66 | 91 | 2.6 |
| Cyclopentane, methyl- | 8.53 | 90 | 1.0 |
| Hexane, 2-methyl- | 9.75 | 91 | 2.5 |
| 2-Methylhexane | 10.03 | 95 | 2.0 |
| Heptane (n-C7) | 10.82 | 94 | 4.1 |
| Methylcyclohexane | 11.56 | 94 | 5.4 |
| Benzene | 11.56 | 90 | < 0.1 |
| Heptane, 2-methyl- | 12.87 | 97 | 3.1 |
| Toluene | 12.95 | 80 | < 0.1 |
| 3-Methylheptane | 13.11 | 94 | 2.2 |
| Cyclohexane, 1,3-dimethyl | 13.28 | 91 | 3.3 |
| n-C8 | 13.90 | 95 | 5.7 |
| Cyclohexane, ethyl- | 14.93 | 90 | 2.7 |
| Octane, 2-methyl- | 15.72 | 86 | 2.3 |
| Octane, 3-methyl- | 15.92 | 83 | 1.8 |
| 1-Ethyl-3-methylcyclohexane | 16.45 | 91 | 1.6 |
| n-C9 | 16.68 | 95 | 5.1 |
| Cyclohexane, propyl- | 17.59 | 95 | 2.0 |
| Nonane, 4-methyl- | 18.26 | 91 | 1.3 |
| Nonane, 2-methyl- | 18.32 | 87 | 1.4 |
| n-C10 | 19.20 | 95 | 5.4 |
| Cyclohexane, butyl- | 20.13 | 95 | 1.1 |
| Decane, 2-methyl- | 20.70 | 91 | 1.2 |
| Decane, 3-methyl- | 20.86 | 83 | 1.2 |
| n-C11 | 21.52 | 94 | 5.1 |
| Cyclohexane, pentyl- | 22.48 | 93 | 1.2 |
| Undecane, 5-methyl- | 22.71 | 81 | 1.2 |
| n-C12 | 23.66 | 94 | 4.6 |
| Cyclohexane, hexyl- | 24.66 | 94 | 1.2 |
| Dodecane, 3-methyl- | 25.09 | 90 | 1.1 |
| n-C13 | 25.66 | 95 | 4.2 |
| n-C14 | 27.52 | 98 | 3.4 |
| Methyl tetradecane | 28.63 | 90 | 1.7 |
| n-C15 | 29.27 | 96 | 2.5 |
| n-C16 | 30.93 | 98 | 1.9 |
| n-C17 | 32.48 | 97 | 1.5 |
| n-C18 | 33.96 | 96 | 1.4 |
| n-C19 | 35.36 | 98 | 1.4 |
| n-C20 | 36.68 | 97 | 0.9 |
| n-C21 | 37.67 | 91 | 0.6 |
| n-C22 | 39.13 | 93 | 0.5 |
| n-C23 | 40.33 | 94 | 0.5 |
| n-C24 | 41.56 | 97 | 0.4 |
| n-C25 | 42.97 | 95 | 0.3 |
| n-C26 | 44.16 | 92 | 0.2 |
| n-C27 | 45.65 | 90 | 0.2 |
| n-C28 | 47.37 | 83 | 0.1 |
| n-C29 | 49.36 | 72 | 0.1 |
| n-C30 | 51.72 | 70 | 0.1 |

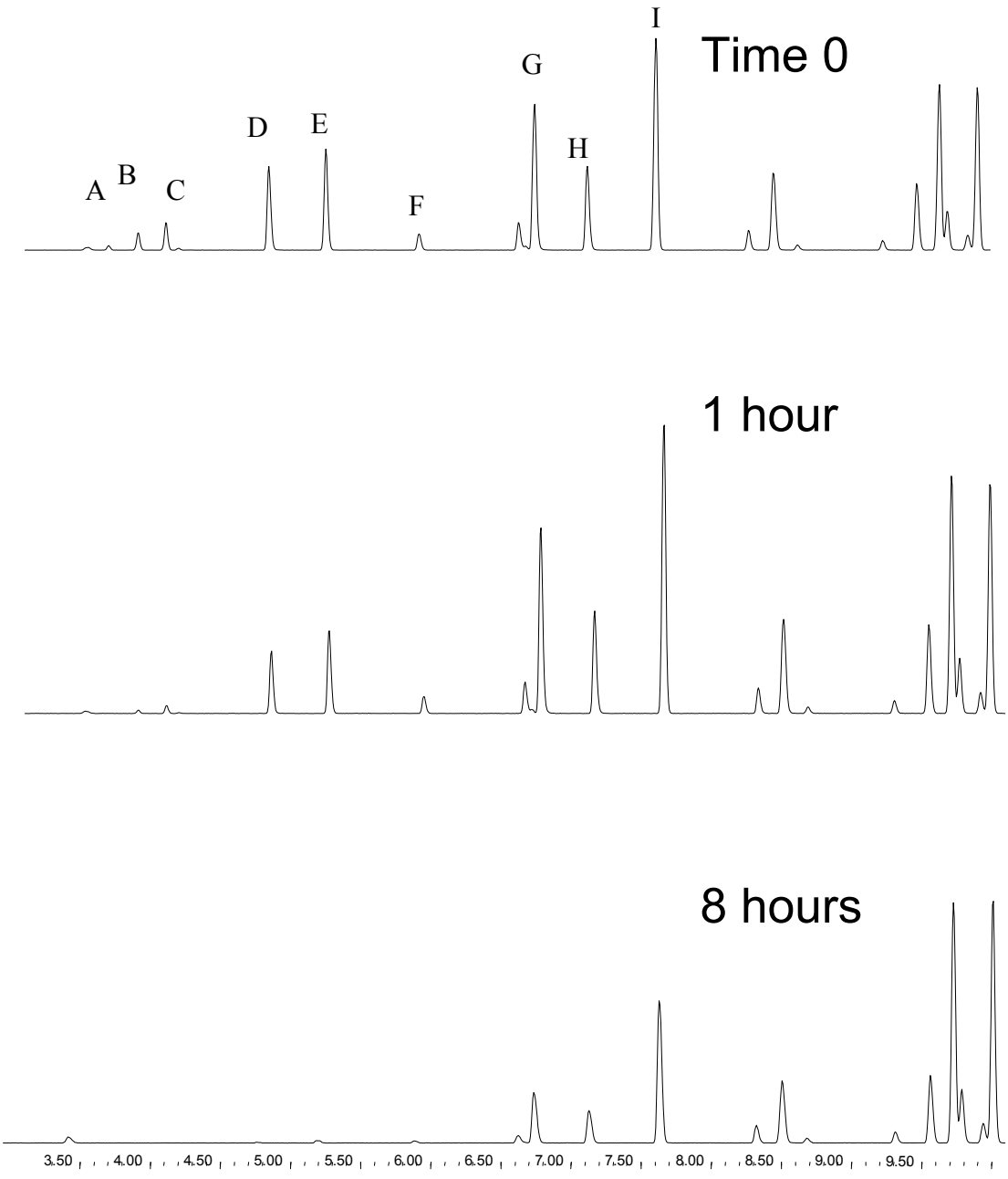
**APPENDIX B**

Total Ion Chromatograms for “Weathered” Oil at Time 0, 1 Hour and 8 Hours



**APPENDIX C**

First 10 minutes of Total Ion Chromatograms for “Weathered” Oil at Time 0, 1 Hour and 8 Hours




A: Propane, B: Isobutane, C: Butane, D: Isopentane, E:Pentane, F:2,2 Dimethylbutane,

**APPENDIX D**

Total Ion Chromatograms for “Dispersed” Oil at Time 0, 1 Hour and 8 Hours